

# 5300 Series

DIGITAL/ANALOG MOBILE RADIO

## SERVICE MANUAL

### 5300 SERIES MOBILE RADIO

- APCO Project 25 Conventional
- APCO Project 25 Trunked
- SMARTNET<sup>®</sup> /SmartZone<sup>®</sup>
- Analog FM Conventional

VHF 10-50 or 50-100 Watts

UHF 7-15 or 10-40 Watts

800 MHz 10-35 Watts

13.6 VDC

**Part No. 242-53xx-xxx**



January 2005  
Part Number: 001-5300-010CD  
Supersedes: 001-5300-009CD; 8/04



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10-50 Watts or 50-100 Watts (VHF),  
15 Watts or 10-40 Watts (UHF), 10-35 Watts (800 MHz)  
Part No. 242-53xx-xxx

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### **Remote Programming Interface (RPI)**

### **Programming Cable Schematic**

**SCHEMATICS AND LAYOUTS FOR EARLY  
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## SECTION 1 GENERAL INFORMATION

### 1.1 SCOPE OF MANUAL

This service manual contains operation, programming, alignment, and service information for the EFJohnson 5300 series mobile radio. The 53SL and Ascend (Multi-Net) models are similar in appearance and covered by separate manuals. The distinguishing characteristics of the 5300, 53SL, and Ascend models are as follows:

#### 5300 Series Mobile

- Part No. 242-53xx-xxx (see Section 1.4)
- “RS-5300” label on top edge of front panel
- Black front panel bezel

#### 53SL Series Mobile

- Part No. 242-54xx-xxx (see Section 1.4)
- “53SL” label on top edge of front panel
- Grey front panel bezel

#### Ascend Series Mobile

- Part No. 242-5580-xxx (see Section 1.4)
- “ASCEND” label on top edge of front panel
- Black front panel bezel

### 1.2 TRANSCEIVER DESCRIPTION

#### 1.2.1 GENERAL

The 5300 series mobile transceivers can operate on various types of channels and with various signaling protocols (see following information). Models are available for operation in the following bands. Repeater talk-around is also available with all bands.

<b>VHF</b>	136-174 MHz (35-watt models) 146-174 MHz (100-watt models)
<b>UHF</b>	380-470 MHz (Federal users only) 403-470 MHz
<b>800 MHz</b>	806-870 MHz (see following)

#### Power Output

Power output is user switchable for low and high levels in the following ranges:

<b>VHF</b>	10-50W standard version, 50-100W high-power version
<b>UHF</b>	7-15W low power version* 10-40W med power version*
<b>800 MHz</b>	10-35W

*\* Version A and B models are available in the 15W configuration only, and Version C models are available in the 40W configuration only (see Section 1.12 for Version A/B/C information).*

#### 1.2.2 ANALOG/DIGITAL OPERATION

The 5300 transceivers use a digital signal processor (DSP) to provide IF and audio filtering and signal modulation functions. This allows operation on the following types of channels, backwards compatibility with existing equipment, and also the ability to operate on various types of radio systems.

Narrow Band Analog - FM modulation is used with a maximum deviation of 2.5 kHz. This mode is usually used in systems with a channel spacing of 12.5 or 15 kHz.

Wideband Analog - FM modulation is used with a maximum deviation of 5 kHz. This mode is usually used in systems where the channel spacing is 25 kHz or 30 kHz.

Project 25 Digital - Operates on Project 25 compatible systems. The voice is digitized, error corrected, optionally encrypted, and then transmitted using C4FM modulation according to the Project 25 standard. This mode uses a channel spacing of 12.5 kHz.

#### 1.2.3 OPERATING PROTOCOLS

The 5300 transceivers can be programmed for all the following operating protocols. The conventional analog protocol is standard and the others are optional (available only if enabled by factory programming). Refer to Section 3 for more operation information.

- APCO Project 25 (digital) conventional
- APCO Project 25 (digital) trunked

- SMARTNET®/SmartZone® trunked analog or digital
- Analog conventional

*NOTE: Multi-Net operation can be programmed with Ascend models only.*

#### 1.2.4 AVAILABLE MOUNTING OPTIONS

**Front Mount** - The operating controls are on the front on the radio, so the radio must be mounted within reach of the user.

**Remote Mount, Single Control Unit** - The operating controls are located on a remote mounted control unit. The radio does not have operating controls.

**Remote Mount, Dual Controls** - A remote control unit is connected to the front mount radio. This allows control from the front panel and the remote control unit.

**Remote Mount, Dual Remote Control Units** - Two remote control units are connected to the remote mount radio. This allows control from both remote control units.

#### 1.2.5 SYSTEMS, CHANNELS, AND ZONES

A zone and channel are selected to place and receive calls. The following describes the relationship between systems, channels, and zones.

##### Systems

A system is a collection of channels or talk groups belonging to the same repeater site. It defines all the parameters and protocol information required to access a site. Up to 16 systems of any type can be programmed. The maximum number of channels assignable to a system is limited to approximately 256 (or the available memory space as described in the following information).

##### Channels

A channel selects a radio channel or talk group in a system as follows:

**Conventional Analog Mode** - A channel selects a specific radio channel, Call Guard (CTCSS/DCS)

squelch coding, and other parameters unique to that channel.

**Conventional Project 25 Mode** - A channel selects a specific radio channel, NAC squelch coding, talk group ID, and other parameters unique to that channel.

**Trunked Project 25 Mode** - A channel selects a specific talk group ID and other parameters unique to that talk group.

**SmartNet/SmartZone and Project 25 Trunked Operation** - A channel selects a specific talk group, announcement group, emergency group, and other parameters unique to that talk group.

As previously described, a maximum of up to 256 channels can be programmed. Although it is theoretically possible to program any combination of systems that produces up to 256 total channels, the maximum number may be limited by the available memory. For example, since more memory is required to program a SMARTNET system than a conventional system, the total number of channels decreases as the number of SMARTNET systems increases. The programming software displays a bar graph which shows the amount of available memory space that is used by the current data. Refer to Section 4 for more information.

##### Zones

A zone is a collection of up to 16 channels of any type. For example, a zone could include 12 conventional channels and 4 SMARTNET channels. One use of zones may be to program the channels used for operation in a specific geographical area. Up to 16 zones can be programmed.

#### 1.2.6 PROGRAMMING

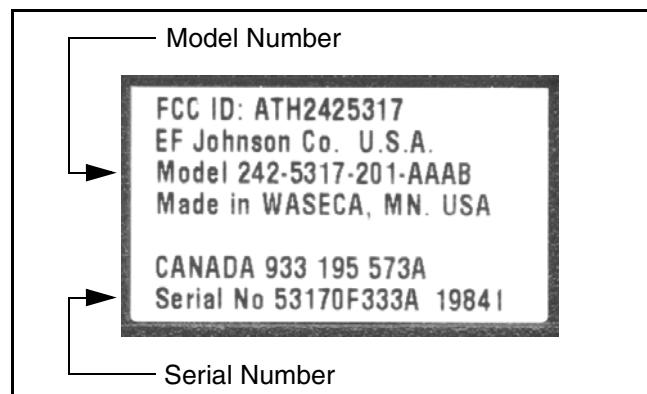
Transceiver programming is performed using a PC-compatible computer and an EFJohnson RPI (Remote Programming Interface) and PCConfigure programming software (see Table 1-1). Programming is described in a separate included manual. Refer to Section 4 for more information.

#### 1.2.7 ALIGNMENT

Transceiver alignment is performed using the same computer and RPI used for programming (see



preceding section) and special PCTune™ software. All adjustments are made electronically using the software (no manual adjustments are required). Alignment is described in Section 6.



**Figure 1-1 Identification Label Example**

### 1.3 PRODUCT WARRANTY

The warranty statement for this transceiver is available from your product supplier or from the Warranty Department, E.F. Johnson Company, 1440 Corporate Drive, Irving, TX 75038-2401. This information may also be requested from the Warranty Department by phone as described in Section 1.7. The Warranty Department may also be contacted for Warranty Service Reports, claim forms, or any other questions concerning warranties or warranty service.

### 1.4 MODEL NUMBER BREAKDOWN

The radio model number is located on the radio identification label attached to the bottom cover (see Figure 1-1). The following is a breakdown of this number:

**242-5MFT-SEC-OADE**

#### **M (Model)**

- 3 - 5300 Series
- 4 - 53SL Series
- 5 - Ascend Series

#### **F (Frequency Band)**

- 1 - VHF (136-174 MHz)
- 2 - VHF HB (146-174 MHz)
- 3 - UHF (403-470 MHz)

- 4 - UHF (450-512 MHz) Not available
- 6 - UHF (380-470 MHz)
- 7 - 762-806 and 806-870 MHz
- 8 - 800-870 MHz

#### **T (Type)**

- 0 - Motorcycle
- 3 - Medium Power (40W UHF), Dash Mount
- 4 - Medium Power (40W UHF,) Remote Mount
- 5 - High Power (100W VHF), Dash Mount
- 6 - High Power (100W VHF), Remote Mount
- 7 - Standard Power, Dash Mount
- 8 - Standard Power, Remote Mount
- 9 - Standard Power, Dash Mount Public Works

#### **S (Signaling, Primary)**

- 2 - P25 Conv. Analog/Digital
- 4 - Special
- 8 - Analog Mode Only

#### **E (Encryption Type)**

- 0 - No encryption
  - 5 - DES/DES-OFB (SEM\*)
  - 6 - DES/DES-XL/DES-OFB (UCM only\*)
  - 7 - DES/DES-OFB/AES (SEM\*)
  - 8 - DES/DES-XL/DES-OFB/AES (UCM only\*)
- (\* See Sections 1.11 and 1.12.2 for more information.)

#### **C (Configuration)**

- 1 - Six button standard control unit
- 4 - Dual Controls (Front + Remote)
- 5 - Handheld Control Unit (HHC)
- 6 - Dual Remote (Two Rem Ctrl Units)
- 7 - Transit Bus System
- 8 - Motorcycle (rotary on-off)
- 9 - Modified logic, B+ on J5, -280 cable

#### **O (Options)**

- A - Std cable, no installed options (-230)
- D - + Data/Accessory cable (-282)
- S - + Siren cable (-231)
- U - + UI cable (-245)
- R - + Remote/Accessory cable (-249)
- T - + Dual remote cable (-283)
- C - + 2nd control hd cable (-251)

#### **A (Analog or Additional Signaling)**

- A - No additional signaling
- B - P25 and SN/SZ trunking analog/digital
- C - SMARTNET trunking
- E - SMARTNET/SmartZone trunking

*NOTE: With 5300 models, analog voice is standard with digital SMARTNET or SmartZone signaling.*

#### D (Data Options)

- A - No data
- B - P25 Conventional Mobile Data
- C - P25 Trunked/Conv Mobile Data\*
- D - Zone Fail, No Data
- F - Zone Fail, Conventional Data
- G - Zone Fail, Trunking Data

#### E (Encryption and Security Software)

- B - Default (non-OTAR)
- C - OTAR P25 conventional and trunked
- D - Same as "C" above

### 1.5 SERIAL NUMBER BREAKDOWN

The radio serial number is located on the radio identification label attached to the bottom cover (see Figure 1-1). The following is a breakdown of this number:

Model From P.N.	Revision Letter	Manufacture Date		Plant	Warranty Number
53xx	0	G	43 4	X	12345
Week No. of Year			<div style="display: flex; align-items: center;"> <div style="border-left: 1px solid black; padding-left: 5px; margin-right: 5px;">A = Waseca T = Texas</div> <div style="border-left: 1px solid black; padding-left: 5px;">Last Digit of Year</div> </div>		

### 1.6 ACCESSORIES

The accessories available for this transceiver are listed in Table 1-1. A brief description of some of these accessories follows:

**Key Cap Kit** - The key cap kit includes key caps labeled for various functions and five plugs that can be inserted in the front panel if a key is not used. Refer to Section 2.8 for more information.

**Mounting Hardware** - The mounting hardware and DC power cable for standard models are shown in Figures 2-1 and 2-3 in Section 2. The mounting hardware and DC power cable for 100-watt models are shown in Figure 2-4. A 22-foot DC power cable is used for both front and remote mount applications. The cable is cut to the required length at installation and any excess discarded.

The accessory cable plugs into the accessory pigtail of the transceiver, and is used to connect such things as an external speaker, ignition sense input, and a horn alert. It includes two 22-foot and three 2-foot wires that are connected as required to external points. The adapter cable is used to connect a 86xx-series power cable to these transceivers.

**Lockable Mounting Tray** - This bracket allows the transceiver to be locked in place to guard against theft. In addition, it allows it to be easily unlocked and removed from the vehicle. This bracket is intended for use with standard models only (not 100W). Refer to Section 2.10 for installation information.

**Microphones and Speaker** - The microphones in Table 1-1 have an impedance of 620 ohms. All DTMF microphones are backlit. The environmentally sealed microphone is sealed against such things as rain, sand, and dust. The desk microphone can be used for control station applications.

The external 15-watt speaker can be used in place of the internal 5-watt speaker. It is non-amplified and weatherproof. This speaker is connected to pins 1 and 2 of the accessory connector pigtail on the back of the transceiver. Audio power output is 12 watts with this external speaker or 5 watts with the internal speaker.

**Control Station Power Supply** - With the -4001-medium-duty power supplies, the transceiver slides into the power supply housing and receives power from banana jacks on the back of the power supply. The standard power cable is used for connecting power, and the internal transceiver speaker provides speaker audio. The -004 adapter cable is used to connect the transceiver DC and accessory pigtail cables to the power supply power cable and speaker. The transceiver internal speaker can also be used if desired.

**Programming Hardware and Software** - The RPI provides the interface between the programming computer and transceiver. The cables from the RPI to computer and transceiver are not included with the RPI and must be ordered separately. The transceiver programming software is available only for computers running Windows® 95/98/NT/2000/XP.

**Table 1-1 5300 Accessories**

Accessory	Part No.
Key Cap Kit (see Section 2.8)	587-5300-001
<b>Mounting Accessories</b>	
Mounting bracket & hardware kit (std)	023-9750-012
Mounting bracket (100W/bot radio only)	017-9700-009
Mounting bracket (100W/bot-top radio)	017-9700-008
DC power cable & hardware, 22 ft. (std)	023-9750-010
DC pwr cable & hardware, 22 ft. (100W)	023-5315-100
Accessory wire kit	023-9750-011
Lockable Mounting Tray (std models only)	585-7000-185
<b>Microphones</b>	
Standard amplified dynamic	250-0740-310
DTMF w/o mem, commercial	589-0016-028
DTMF w/o mem, env seal WR805	587-9650-015
Noise canceling, weather resistant	589-0016-592
Desk microphone	589-0012-021
<b>Speakers</b>	
External, 5" 15W 3.2 ohm environmental sealed w/plug for HHC	250-0151-005
External, 5" 15W 3.2 ohm environmental sealed w/terminals for acc cable	250-0151-006
External, 5", 15W 3.2 ohm motorcycle w/mute sw	250-0151-015
<b>Handheld Control Unit and Siren Controller</b>	
Handheld control unit w/junction box and 17 ft control cable	250-5300-101
Handheld control unit junction box only	250-5300-102
Siren controller kit (w/o loudspeaker)	250-5300-100
Siren loudspeaker, model TS100 for light bar installation	585-5300-007
Siren loudspeaker, model MS100 compact for behind grill installation	585-5300-009
<b>Remote Control Conversion Kit</b>	
Dual control kit (convert fit mt to remote or dual controls)	250-5300-001
<b>Control station power supplies</b>	
15 amp, 117 VAC, 60 Hz (medium duty)	585-4001-202
15 amp, 230 VAC, 50 Hz (medium duty)	585-4001-204
30 amp, heavy duty for 100W models	250-5300-212
DC and speaker cable adapter for -0226- supply	023-9650-004
<b>Programming Accessories</b>	
Remote prog interface (RPI)	023-5300-000
Cable, RPI to transceiver	023-5300-005
Cable, RPI to computer DB9M-DB9F 6 ft	597-5900-002

**Table 1-1 5300 Accessories (Continued)**

Accessory	Part No.
PCConfigure prog software, CD	023-9998-488
PCTune software, CD (current logic bds)	023-9998-499
PCTune software, CD (Rev 3 and earlier bds; radio PN 242-531x-1xx)	023-5000-093
Programming Kit, includes -488 software, -005 cable, RPI, CD prog manual	250-5000-004
Handheld control unit prog cable adapter	023-5300-140
<b>Encryption Keyloader and Accessories</b>	
SMA (PDA) keyloader	250-5000-945
SMA keyloader to 5100 radio cable	023-5000-940
SMA keyloader to 5300 radio cable	023-5000-950
<b>Accessory Pigtail Cables</b>	See Section 2.9

**Encryption Options** - In radios using the new revised PPC logic board that require encryption, the radio is ordered with either the EFJohnson SEM module or the Motorola UCM module (see Section 1.12.2). With radios using the ARM board, encrypted radios are equipped with a different version of the UCM module. Modules are available for only Revision 6 or later versions of this board. Contact Customer Service for more information on the availability of encryption modules.

A key loader and an adapter cable are required to load encryption keys. The EFJohnson SMA (Subscriber Management Assistant) key loader part number is listed in Table 1-1. With OTAR, the key loader is required to perform the initial load of keys and after that the keys are loaded over the air. The adapter cable connects the key loader to the transceiver microphone jack. Special programming using PCConfigure is also required as described in Section 4.

## 1.7 FACTORY CUSTOMER SERVICE

The Customer Service Department of the E.F. Johnson Company provides customer assistance on technical problems and the availability of local and factory repair facilities. Regular Customer Service hours are 8:00 a.m. - 5:00 p.m. Central Time, Monday-Friday. A technical support subscription service is available or support can be purchased on an as-needed

basis. The Customer Service Department can be reached using the following telephone numbers:

**Toll-Free: (800) 328-3911 (all except Multi-Net)**

**(800) 295-1773 (Multi-Net only)**

**FAX: (972) 818-0639**

**E-Mail: [customerservice@efjohnson.com](mailto:customerservice@efjohnson.com)**

You can also e-mail a person directly if you know their first initial/last name (example: [jsmith@efjohnson.com](mailto:jsmith@efjohnson.com)).

*NOTE: Emergency 24-hour technical support is also available at the 800 and preceding numbers during off hours, holidays, and weekends.*

When your call is answered at the E.F. Johnson Company, you will hear a brief message informing you of numbers that can be entered to reach various departments. This number may be entered during or after the message using a tone-type telephone. If you wait until the message is finished and an operator will come on the line to assist you. When you enter some numbers, another number is requested to further categorize the type of information you need.

You may also contact the Customer Service Department by mail. Please include all information that may be helpful in solving your problem. The mailing address is as follows:

E.F. Johnson Company  
Customer Service Department  
1440 Corporate Drive  
Irving, TX 75038-2401

## 1.8 RETURNS FOR REPAIRS

Repair service is normally available through local authorized EFJohnson Land Mobile Radio Service Centers. However, before returning equipment, contact the Customer Service Repair Depot for the correct "Ship To" address. It is suggested that you call Tech Support as they may be able to suggest a solution to the problem that would make return of the equipment unnecessary.

Be sure to fill out a Factory Repair Request Form #271 for each unit to be repaired, whether it is in or out of warranty. These forms are available free of

charge by calling Customer Service (see Section 1.7) or by requesting them when you send a unit in for repair. Clearly describe the difficulty experienced in the space provided and also note any prior physical damage to the equipment. Include this form in the shipping container with each unit. Your telephone number and contact name are important as there are times when the technicians may have specific questions that need to be answered in order to completely identify and repair a problem.

When returning equipment for repair, it is also recommended that you use a PO number or some other reference number on your paperwork in case you need to call the repair lab about your unit. These numbers are referenced on the repair order and make it easier and faster to locate your unit in the lab.

Return Authorization (RA) numbers are not necessary unless you have been given one by the Field Service Department. RA numbers are required for exchange units or if the Field Service Department wants to be aware of a specific problem. If you have been given an RA number, reference this number on the Factory Repair Request Form sent with the unit. The repair lab will then contact the Field Service Department when the unit arrives. For additional information on factory service, the Depot Service Department can be contacted at the following E-mail address:

**[depotrepair@efjohnson.com](mailto:depotrepair@efjohnson.com)**

## 1.9 REPLACEMENT PARTS

Replacement parts can be ordered directly from the Service Parts Department. To order parts by phone, dial the toll-free number as described in Section 1.7. When ordering, please supply the part number and quantity of each part ordered. EFJohnson dealers also need to give their account number. If there is uncertainty about the part number, include the designator (C512, for example) and the model number of the equipment the part is from.

You may also send your order by mail or FAX. The mailing address is as follows and the FAX number is shown in Section 1.7.

E.F. Johnson Company  
Service Parts Department  
1440 Corporate Drive  
Irving, TX 75038-2401

## 1.10 INTERNET HOME PAGE

The E.F. Johnson Company has a site on the World Wide Web that can be accessed for information on the company about such things as products, systems, and regulations. The address is <http://www.efjohnson.com>.

## 1.11 SECURE COMMUNICATION

*NOTE: Refer to Section 11 of the 5300 Operating Manual for more information on secure communication. A link to the operating manual is located in Section 3 of this manual.*

### 1.11.1 GENERAL

SecureNet™ and AES voice encryption are used to provide secure communication with this transceiver. These protocols digitize the voice and then encrypt it using a DES or AES algorithm. The following types of encryption are available on analog and digital channels:

#### **Analog Conventional and SMARTNET/SmartZone Analog Channels**

- DES
- DES-XL (5300 versions with UCM module only; see Section 1.12.2)

#### **Digital Project 25 and SMARTNET/SmartZone Channels**

- DES-OFB (Output Feedback)
- AES (Advanced Encryption Standard). Later 5300 models only. Refer to Section 11 of the 5300 Operating Manual for more information (a link is located in Section 3).

### 1.11.2 FIPS 140-2 APPROVED ENCRYPTION

All encrypted 5300 models are FIPS certified for the DES-OFB and AES encryption modes. Encryp-

tion on analog channels is not FIPS certified. FIPS 140-02 is a Federal Information Processing Standard recently approved by the United States Secretary of Commerce. This standard specifies Federal security requirements for cryptographic modules for a wide range of applications and environments.

### 1.11.3 OVER-THE-AIR-REKEYING (OTAR)

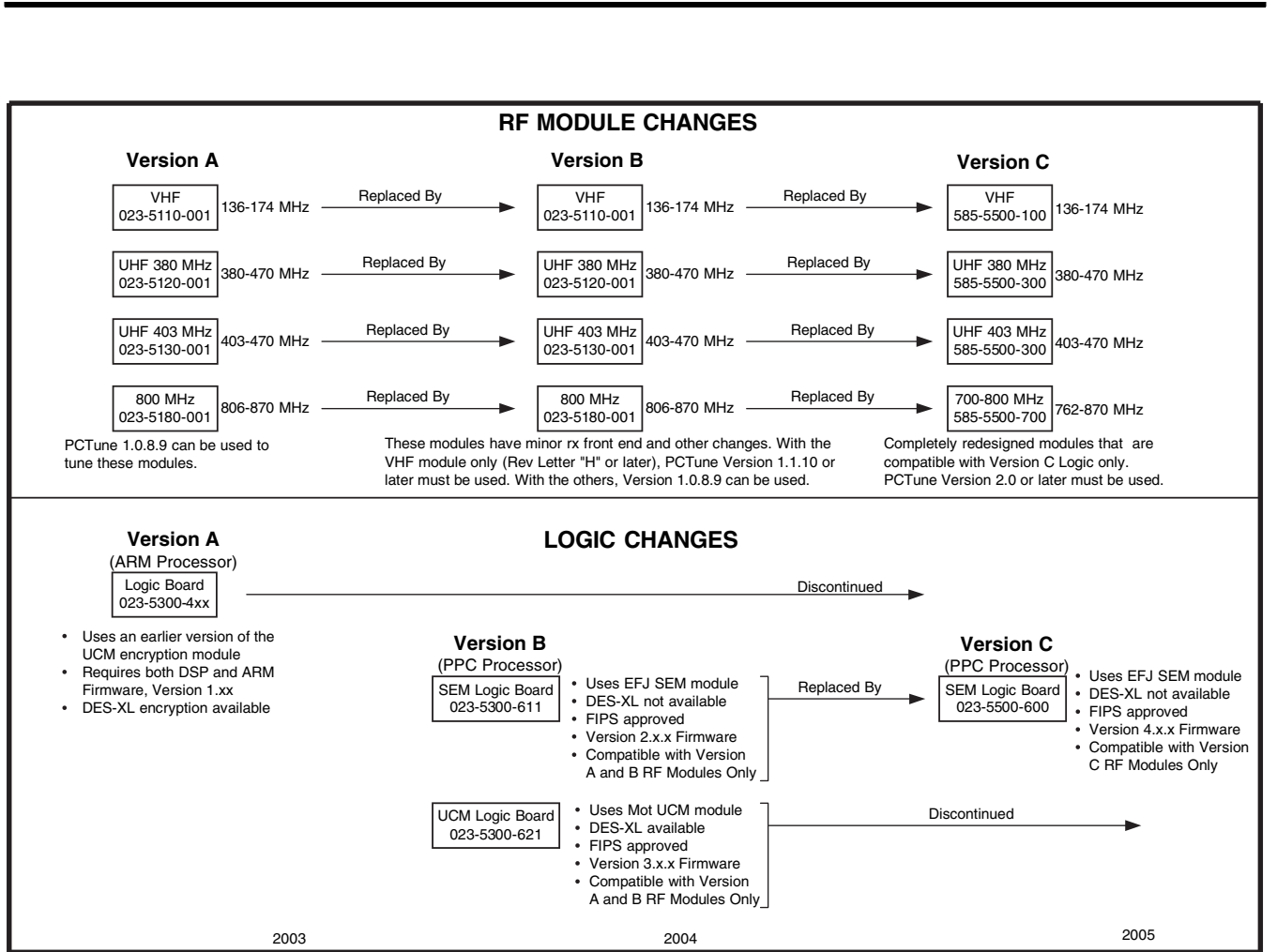
Encryption keys are loaded into the radio by OTAR (Over-The-Air-Rekeying) using a KMF (Key Management Facility) and/or a handheld keyloader such as the EFJohnson SMA (Subscriber Management Assistant) or Motorola KVL 3000 Plus with the AES option.

The keyloader is connected directly to the radio using an interconnect cable, and it loads DES, DES-OFB, and AES keys. Currently, OTAR can be used to load DES-OFB keys on Project 25 conventional channels. Future OTAR of AES keys and on Project 25 trunked channels is planned. Refer to Section 11 of the 5300 Operating Manual for more OTAR information. A link to this manual is located in Section 3 of this manual.

### 1.11.4 KEY RETENTION

*NOTE: The 5300 radio has a security feature (push-button switch S1 on the logic board) that automatically erases the encryption keys when the bottom cover is removed (except when Infinite Key Retention is programmed as follows).*

If Infinite Key Retention Infinite Key Retention is programmed, the keys are maintained in memory indefinitely, even without power applied. If it is not programmed, the transceiver must be connected to an unswitched power source to preserve the encryption keys in memory. However, a storage capacitor (C173, 0.22 F) maintains the 5-volt supply (and the encryption keys) for approximately 8 hours if power is temporarily lost.



### Figure 1-2 Hardware Changes Flowchart

## 1.12 RADIO HARDWARE CHANGES

*NOTE: Version A/B/C references in the following information are for descriptive purposes in this manual only and do not correspond to any radio revision letters or letters on the boards.*

### 1.12.1 RF MODULE CHANGES

As shown in Figure 1-1, there have been three significant changes to the 5300 RF module. More information on each of these versions follows.

**Version A** - This is the original version that was used until approximately late 2003. All versions of PCTune can be used to tune radios with these modules. The schematic diagrams and board layout for this version of the VHF board are located in the Early\_Bds folder and the other boards are located in Section 8.

**Version B** - The changeover to this version occurred starting in late 2003. This change was made because of

parts obsolescence. Significant changes occurred to only the VHF board, so this is the only board with revised schematics and layouts in this manual. With the UHF and 800 MHz boards, only minor layout and value changes occurred. The Version B boards are being replaced by the following Version C boards as they become available.

*NOTE: PCTune, Version 1.10.0 or later must be used to tune VHF radios with this board (see following).*

PCTune Version 1.10.0 or later must be used to adjust radios with this version VHF board because of changes made in the front end. The earlier PCTune version (1.0.8.9) can still be used to tune all other Version B and all Version A boards.

The Revision Letter in the radio identification number (see Section 1.5) can be used to determine if a VHF radio has this new Version B board. Radios with a revision letter of “H” or later have the new board and PCTune 1.10.0 or later must be used.

**Table 1-2 53xx Firmware/Logic Board Versions**

Firmware Version	Application (Firmware) Code Base	Analog Channel Encryption		Digital Channel Encryption	
		DES	DES-XL	DES-OFB	AES
<b>Version 1 (Uses early Motorola UCM module)</b> This is the ARM logic version which uses a different UCM module than is used in Version 3 which follows. This version is no longer available and uses the 035-1800-4xx Version C logic board.	1.xx (both DSP and ARM code required)	Yes	Yes	Yes	Yes
<b>Version 2 (uses EFJ SEM module)</b> Current version which has the EFJohnson SEM (Subscriber Encryption Module) on the logic board. This version uses the 035-5300-600 Version B logic board. All radios include the SEM, and the desired encryption options (if any) are enabled by factory programming. FIPS approved.	2.xx	Yes	No	Yes	Yes
<b>Version 3 (uses Motorola UCM module)</b> Current version (B) which has the Motorola UCM (Universal Crypto Module) on the logic board. This version also uses the 035-5300-600 Version B logic board with the addition of a few parts. This version is ordered when DES-XL encryption is required. FIPS approved.	3.xx	Yes	Yes	Yes	Yes
<b>Version 4 (uses EFJ SEM module)</b> New version (C) designed for use with new RF modules. It uses the same EFJohnson SEM (Subscriber Encryption Module) as Version 2 boards above. This version uses the 035-5500-600 Version C logic board. All radios include the SEM, and the desired encryption options (if any) are enabled by factory programming. FIPS approved.	4.xx	Yes	No	Yes	Yes

**Version C** - These boards are a completely new design. Highlights of this board version are as follows:

- Because of different interface requirements, the new Version C logic board described in the next section must be used with these RF boards.
- A new version of the PCTune software (2.0 or later) is required to tune radios with these boards.
- The new 800 MHz version of this board (not currently available with 53xx) operates on both 700 and 800 MHz channels instead of only 800 MHz channels like the A and B versions. Therefore, radios with the Version C board can operate on channels from 762-870 MHz, while radios with the earlier Version A and B boards can operate only on channels from 806-870 MHz.

Radios with this new 700/800 MHz RF board have a “7” as the “F” character of the radio part number (see Section 1.4), while radios with the older A and B versions have an “8” for this character.

### 1.12.2 LOGIC BOARD CHANGES

As shown in Figure 1-1 and Table 1-2, there have been three significant changes to the control logic used in 53xx series radios. More information on these changes follows.

*NOTE: The firmware version number (1.x/2.x/3.x) is the second number briefly displayed when radio power is turned on (the first number is for the control unit).*

**Version A** - This version uses ARM processor-based control logic, and the PC board is Part No.

035-1800-42x. This board has a jack for plugging in various Motorola encryption modules that provide DES/DES-XL/DES-OFB and AES encryption. It does not use the SEM module. This service manual includes schematic, board layout, and parts information for this and an even earlier -40x version of this board. This board is no longer shipping in new radios and has been replaced by the following PPC versions.

Radios with this logic board have Version 1.x firmware (see Table 1-2). Both DSP and ARM code files may be required to update the firmware.

### **Version B**

Beginning in November 2003, a revised logic board began shipping in 53xx models. This board utilizes a Power PC (PPC) control logic design similar to that used in the 51xx portable. This board is available in the following configurations:

SEM Version - This version has the EFJohnson SEM (Security Encryption Module) soldered to the board. It is used whenever DES, DES-OFB, or AES encryption is required. DES-XL encryption is not available with this version. Radios with this logic board have Version 2.x firmware (see Table 1-2).

UCM Version - This version includes a plug-in Motorola UCM encryption module instead of the

SEM. It is used whenever DES-XL Motorola proprietary encryption is required. It also provides DES, DES-OFB, or AES encryption. Other differences between this board and the SEM version are that it has a jack for plugging in the module (J2) and an additional PLC IC (U82). Radios with this logic board have Version 3.x firmware (see Table 1-2).

The part number of the Version B logic board is 035-5300-600. The same PC board is used for both of the preceding configurations (each version is populated differently). This service manual includes schematic, board layout, and parts list information for this new logic board.

Radios with the new PPC revised logic board have a Revision Letter of “G” or higher in the serial number. Radios with the early -400/-410 ARM logic board have a A-F Revision letter. Refer to the radio Serial Number on the label on the bottom cover to determine the Revision Letter (see Section 1.5).

**Version C** - This version of the logic and UI boards is a new design that is required to interface with the new Version C RF module. Only a SEM version is being offered (similar to Version 2 in Table 1-2). This version of board has more Flash and RAM memory to allow additional features to be added if necessary. Radios with this logic board have Version 4.x.x firmware (see Table 1-2).



## 5300 SERIES MOBILE SPECIFICATIONS

The following are general specifications intended for use in testing and servicing this transceiver. For current advertised specifications, refer to the specification sheet available from your sales representative. Values are typical and are subject to change without notice.

### GENERAL

Frequency Range	VHF: 136-174 MHz standard models; 146-174 MHz high power models UHF: 403-470 MHz; 380-470 MHz 800 MHz: 806-824 MHz Tx std, 851-869 MHz Tx Tlk-Ard, 851-869 MHz Rx
Operating Modes	Conv, Project 25 Conv, Project 25 Trunked, SMARTNET, SmartZone
Mounting Location	Dash Mount (Remote mount optional)
Zones/Channels	Up to 16 zones with 16 channels per zone
Transmit/Receive Separation	Any frequency within the range
Channel Spacing	VHF: 12.5, 15, 25, and 30 kHz UHF: 12.5 and 25 kHz 800 MHz: 12.5 and 25 kHz
Maximum Deviation	25 kHz analog - 5 kHz 12.5 kHz analog - 2.5 kHz 12.5 kHz analog NPSPAC - 4.0 kHz
Frequency Stability Rx and Tx	2.5 PPM VHF, 2.0 PPM UHF, 2.5 PPM 800 MHz (–30° to +60° C)
Dimensions (w/o antenna)	Std - 2.1" H x 7.2" W x 8.3" D (5.3 cm x 18.2 cm x 21.1 cm) 100W - 2.1" H x 7.2" W x 13.75" D (5.3 cm x 18.2 cm x 34.9 cm)
Weight (w/std battery)	5 lbs. 4 oz. (2.38 kg)
Supply Voltage	13.6 volts DC nominal, negative ground
Current Drain (maximum)	Standby - 600 mA Receive (rated audio out) - 2.7 A Rated Tx Power - 13.2 A (std), 27.5A (100W)

### RECEIVER

Sensitivity	0.35 $\mu$ V (analog mode 12 dB SINAD), 0.35 $\mu$ V (digital mode 5% BER)
Selectivity	–75 dB
Spurious and Image Rejection	–75 dB
Intermodulation	–75 dB VHF, –77 dB UHF, –73 dB 800 MHz
Hum and Noise	40 dB at 25 kHz, 34 dB at 12.5 kHz
Maximum Frequency Spread	Any spread within the range
Audio Power Output	5 W with internal speaker (12 W w/external 4-ohm speaker)
Audio Distortion	Less than 3% at 1 kHz

### TRANSMITTER

RF Power Output	VHF medium power: 10-50 W, VHF high power: 50-100 W UHF low power: 7-15W, UHF medium power: 10-40 W 800 MHz medium power: 10-35 W
Spurious and Harmonic Emissions	–70 dB (VHF), –60 dB (800 MHz)
FM Hum and Noise	–45 dB at 25 kHz bandwidth
Audio Modulation	8K10F1E, 11K0F3E (VHF/UHF), 14K0F3E (800 MHz), 16K0F3E, 20K0F1E
Audio Distortion	Less than 3% at 1 kHz
Maximum Frequency Spread	Any spread within the band

## REVISION SUMMARY

### REVISIONS INCLUDED IN THIS MANUAL

This manual includes the revisions included in previous versions plus the following:

- Included information on the Version C UHF RF module.
- Included information on the Version C logic board used with the Version C RF module. Also included information on the new Interface and Interconnect boards used with these Version C boards.
- Included information on the new 40W UHF PA board.
- Included the latest operating and programming manuals.
- Miscellaneous hardware and other updates
- Recent accessory pigtail cables include an EMI board which provides electromagnetic interference protection in series with each wire. Currently, only the Accessory cable, Part No. 023-5300-630, is available (see Section 2.9 for more information).
- Included information on a Version B PPC logic board (see Section 1.12.2). Also miscellaneous updates to Section 1.
- Updated Installation information (Section 2) with additional photos, changes for remote control unit programming, and other information.
- New remote control unit audio PA board and display controller board layout (same controller schematic) to add 5-pin connector to boards.

### REVISIONS INCLUDED IN PREVIOUS -009 MANUAL

The following information summarizes the main changes that were included in the -009 5300 Service Manual with a release date of August 2004.

- Included information on Version B RF modules (see Section 1.12.1). Also miscellaneous updates to Section 1.
- The latest operating and programming manuals are included.
- Miscellaneous hardware updates

### REVISIONS INCLUDED IN PREVIOUS -008 MANUAL

The following information summarizes the main changes that were included in the -008 5300 Service Manual with a release date of November 2003.

### REVISIONS INCLUDED IN PREVIOUS -007 MANUAL

The following information summarizes the main changes that were included in the -007 5300 Service Manual with a release date of August 2003.

- Miscellaneous updates to Section 1.
- The latest operating information (Section 3) and programming information (Section 4).
- Updated Installation information (Section 2) with added important installation guidelines, dual remote, and other changes.
- Updated Alignment (Section 6) with information on how to check performance in digital mode.
- Updated logic board that includes changes for proper horn alert operation. The horn alert is now controlled by the H3 pin of U6. Several parts were changed, deleted, and added.

### REVISIONS INCLUDED IN PREVIOUS -006 MANUAL

The following information summarizes the main changes that were included in the -006 5300 Service Manual with a printing date of November 2002.

- Miscellaneous changes to VHF and UHF PA boards.
- Other miscellaneous updates.

## REVISIONS INCLUDED IN PREVIOUS -005 MANUAL

The following information summarizes the main changes that were included in the -005 5300 Service Manual with a printing date of July 2002.

### Operation Changes (see Section 3)

- The Hardware Key select option switch is available on conventional channels only.
- The Normal/Selective option switch now disables P25 group ID detect instead of NAC. In addition, cycling power no longer reselects the default mode.
- With both conventional and SMARTNET/SmartZone operation, up to 256 scan lists and 256 channels/groups per list can be programmed.
- SMARTNET/SmartZone scan lists can now be temporarily selected by a new Scan (List) Select option switch).

### Hardware Changes

- Added information for the new UHF models
- Logic board clock circuit change. Also, R240 on input of U19A changed and buffers on J4, pins 8 and 9 deleted.
- New display controller board layout. The only electrical changes were R2, R104, and R105.
- Other miscellaneous minor updates

## REVISIONS INCLUDED IN PREVIOUS -004 MANUAL

The following information summarizes the main changes that were included in the -004 5300 Service Manual with a printing date of March 2002. That manual replaced the -003 manual which had a printing date of March 2000.

### PCConfigure Programming Software

The PCTrunk programming software has been replaced with PCConfigure. This software has an entirely new user interface (programming screens) although the information programmed is basically the same. PCConfigure is required to program many of the features in current models, so it is recommended that you upgrade to PCConfigure. Refer to Section 4 for more information on the PCConfigure software.

### New Logic Board

The logic board is a new design with different parts and layout. The schematic and board layout in this manual have been updated with this new board. Information for the earlier boards is included in the Early\_Bds folder on the CD-ROM.

This new logic board is Revision 5 or later, and it provides a new optional enhanced “Over The Air Re-Keying” (OTAR) feature for use with SecureNet encryption. The Revision 6 or later board is required to use the currently available UCM encryption module (see Section 1.6).

Models with the Revision 6 or later logic board have a revision later of “G” or higher (standard power models) or “B” or higher (100W VHF models). Refer to Section 1.5 for more revision letter information.

### New RF Boards

A new VHF RF board is being used and a new 800 MHz RF board is being phased in. These boards have a new pin out arrangement that requires a short ribbon cable and new interconnect board design. Section 8 includes the schematics and layouts for the revised boards, and Early\_Bds folder on the CD-ROM includes this information for the unrevised boards.

Models with the new RF board have a revision later of “H” or higher (standard power models) or “C” or higher (100W VHF models). Refer to Section 1.5 for more revision letter information.

### New VHF (50W) PA Board

A newly designed PA board is now being used. The main change to this board was converting several mini mica capacitors to ceramic type. Tap points were also added for the cables to the 100W PA board when it is used. The schematic and layout for this new board is included in this manual, and the earlier board is included in the Early\_Bds folder on the CD-ROM.

### New VHF 100W Models

This manual includes installation and servicing information for the new 100W VHF transceiver. This

transceiver includes an additional PA deck on the back which contains a new 100W PA board.

#### New Display Controller Board

A running change is being made to a new display controller board. The new board uses a different microcontroller and allows the control head operating software to be re-Flashed through the front panel microphone jack. Information for the earlier board is included in the Early\_Bds folder on the CD-ROM.

#### Handheld Control Unit

A Handheld Control Unit is now available. This control unit has all user controls and the display in a compact unit similar in size to a microphone. It replaces the standard remote control unit in remote mount applications. An external speaker is required because it does not have an internal speaker. An optional junction box is available that has jacks for earphone/microphone, line out, speaker out, and transceiver programming. Installation, operation, and servicing information for this control unit are included in this manual.

#### Siren

A siren option is now available that operates with the 5300 transceiver. The transceiver microphone is used for the siren PA function, and receive audio can be routed through the siren loudspeaker and the volume controlled by the transceiver volume switch. In addition, the siren controller backlight is controlled by the transceiver.

To provide siren control, a siren control pigtail cable must be installed in the transceiver. To accommodate this cable, J6 has been added to the logic board (Revision 6 or later) and J201 has been added to the interface board. Installation information for the siren controller is included in this manual.

#### New Features (see Section 3)

- A Selective Squelch option switch can now be programmed with conventional analog and digital (P25) operation. This switch allows the CTCSS/DCS/NAC code to be selected from a preprogrammed list.

- A Hardware Key Select option switch is now programmable with SecureNet encryption. This switch allows the hardware keys to be manually selected.
- The transceiver can now be programmed so that a password must be entered at power-up to make the transceiver operational. This prevents unauthorized use.

#### Specifications (Page 1-8)

Clarified 800 MHz frequency range.

#### Backlight

Clarified viewing angle adjust procedure.

#### Setting Squelch

The squelch can now be adjusted by keypad programming.

#### Scanning

Off-Hook Scanning - With models manufactured in late 2000 or after, scanning halts with a microphone off-hook condition.

Standard Mode Scan Lists - SMARTNET/SmartZone scan lists are now user programmable.

Nuisance Channel Add/Delete - SMARTNET/SmartZone channels, channels can also be permanently added or deleted.

#### Project 25 Features

Individual, Group, and NAC Codes - The NAC 293 code functions like any other code. If it is programmed, all NACs are not ignored and the squelch opens only if it is detected.

#### Monitor Mode

When not scanning, briefly pressing or pressing and holding the Monitor switch always monitors the channel on which the transmission will occur. When scanning, briefly pressing this switch monitors that channel, and pressing and holding it moni-

tors the current scanned channel which may be different.

Taking the microphone off-hook disables scanning with models manufactured in late 2000 or later (unless off-hook detection has been disabled by programming).

#### Standard Group Calls

Receiving a Standard Group Call - When a SMARTNET/SmartZone group call is received, the transceiver can be programmed to briefly display the Individual ID of the calling mobile.

#### Interconnect Schematics

Interconnect schematics on pages 8-4 and 8-28, corrected accessory pigtail cable error (near J100/P101).

#### 800 MHz PA Board Schematic

In the lower left corner, power on-off transistor Q513 was incorrectly labeled Q500. Also, in the lower center, 8V Regulator U506, pin numbers 2 and 3 were reversed. Added R604 and R605 on U504 output.

#### Logic Board (Revision 3) Top View (in Early\_Bds folder on the CD-ROM)

In the upper right, U9 pin numbering was off by 90 degrees. In addition, in the center, J9 pin numbers 1 and 2 were reversed (27 and 28 are correct).

## SECTION 2 INSTALLATION

### 2.1 IMPORTANT DIGITAL RADIO INSTALLATION INFORMATION

#### 2.1.1 INTRODUCTION

*NOTE: If audio holes or a “warbling” sound is heard in received signals, the cause may be excessive electrical noise in the vehicle transmitting the message. Refer to the following for more information.*

With digital radios such as the EFJohnson 5300, electrical noise on the DC power input is not the typical noise heard with analog radios such as alternator whine. Instead, it causes audio holes (missing parts of words) or a “warbling” sound in messages received from a radio in a vehicle that has this problem.

Much of this electrical noise is caused by improper radio installation techniques. Observing the following installation guidelines normally eliminates this problem. If it does not, it is recommended that the vehicle be checked by a dealer for defective components such as the fuel pump, alternator, battery, control computer, or lights. If noise is still a problem, try installing a noise filter such as the EFJohnson 17-Ampere In-Line Noise Filter, Part No. 517-2003-017 (for standard power radios only).

#### 2.1.2 INSTALLATION GUIDELINES

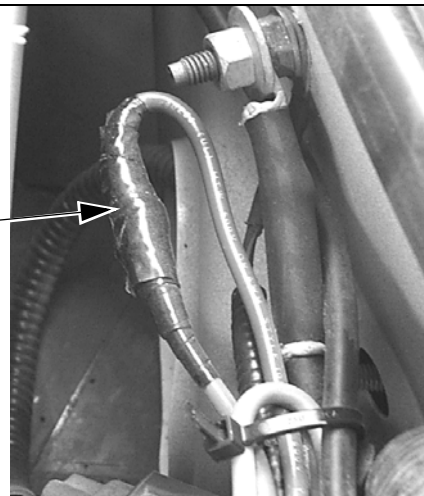
*NOTE: For proper digital radio operation, the noise level at the battery and power connector of the radio*

*should be 50 mV or less when measured by an oscilloscope.*

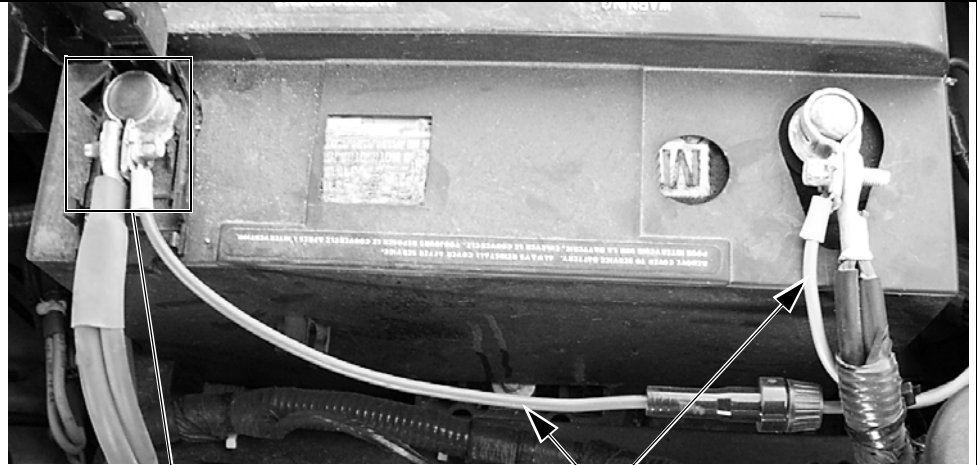
- Connect both wires of the power cable (standard power models) or the red power cable (high power models) directly to the vehicle battery (see photo which follows). Use a minimum length of cable.
- Do not connect the power cable to a switched power source such as a kill switch because de-affiliation and proper saving of some parameters then does not occur at power off. Use the ignition sense line to switch power as described in “ACCESSORY CABLE INSTALLATION” on page 2-8. Current drain in the off mode with this configuration is only about 0.75 mA with standard models and 2.25 mA with 100-watt models.
- Do not route the power cable and coaxial cable in the same bundle except when required such as to get through a firewall. Keep this type of routing short and close to the radio. Do not coil up extra power cable and attach it to other wires or coaxial cable. Use only the minimum length of cable required.
- Mount the antenna on the roof or center of the trunk lid and at least 5 feet from other antennas. Do not mount it on a light bar, next to a video camera, or on a small “L” bracket on the fender lip.
- Do not use adapters to connect the antenna to the Type N antenna jack of the radio. Change the antenna connector to the correct type if required.

**CORRECT →**

Splices should be made by wrapping the wires together and then soldering the connection. Insulate the splice with electrical tape or heat shrink tubing.



**CORRECT →**



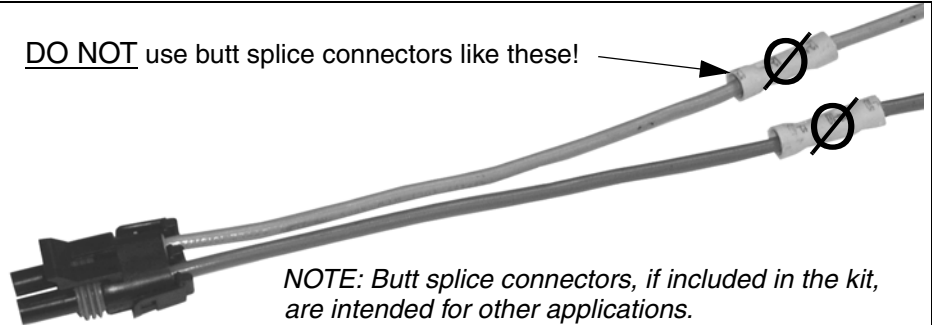
Radio Power Cable



Solder ring terminal to wire and attach it directly to battery clamp bolt

**INCORRECT →**

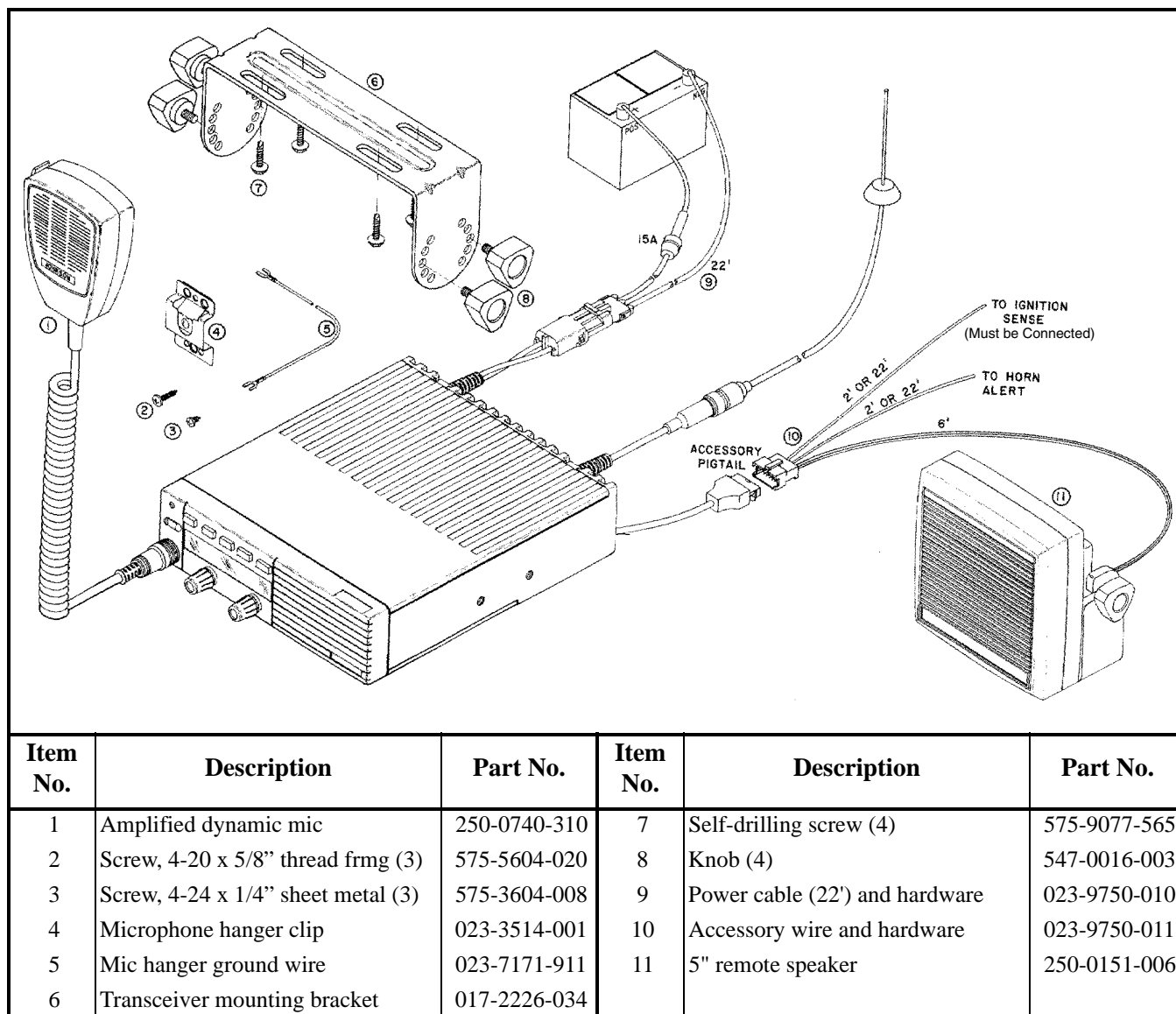
DO NOT use butt splice connectors like these!



**INCORRECT →**



DO NOT make excessive splices.  
Use a maximum of one splice per wire.



**Figure 2-1 Front Mount Installation Components**

## 2.2 GENERAL INFORMATION

### 2.2.1 SCOPE OF INSTRUCTIONS

Since each installation is somewhat unique, the following installation instructions are intended only as a general guide to installing this transceiver. Described are the intended use of the mounting hardware and the electrical connections that should be made.

### 2.2.2 PERFORMANCE TESTS

Although each transceiver is carefully aligned and tested at the factory, shipment can alter these

settings or damage the transceiver. Therefore, it is good practice to check transceiver performance before it is placed in service.

### 2.2.3 TRANSCEIVER PROGRAMMING

The transceiver needs to be programmed before it is placed in service unless it was ordered as factory programmed. Programming instructions are located in Section 4. Transceivers not factory programmed are shipped programmed with test channels and other factory test parameters.



## 2.2.4 POWER SOURCE

*NOTE: The ignition sense line must be connected as described in Section 2.5.2 for power up to occur.*

This transceiver is designed for installation only in vehicles which have a 12-volt, negative ground electrical system. This type of electrical system has the negative battery terminal connected directly to the vehicle chassis. Other types of electrical systems require a voltage converter, and external functions such as ignition sense and horn alert may require a special interface.

## 2.3 TRANSCEIVER INSTALLATION (FRONT AND REMOTE MOUNT)

### 2.3.1 MOUNTING CONFIGURATIONS

Models of this transceiver are available for the following installation configurations:

**Front Mount** - The control unit is part of the transceiver, so the transceiver must be installed within reach of the operator.

**Remote Mount** - The control unit is a separate assembly which can be installed up to 17 feet from the transceiver which has a blank front panel (see Figure 2-2).

**Dual Control** - The remote control unit is connected to a front-mount transceiver. This allows the transceiver to be controlled from both the transceiver front panel and the remote control unit. The displays on the transceiver and control unit indicate identical information.

**Dual Remote** - Two remote control units are connected to a remote mount transceiver. This allows the transceiver to be mounted remotely from both control units. The displays on the control units indicate identical information.

### 2.3.2 SELECTING A MOUNTING LOCATION

Front-mount transceivers are designed for mounting in a location near the operator such as the dash, console, or transmission hump. Remote-mount transceivers are designed for mounting in an out-of-the-way location such as the trunk.

## WARNING

*The mounting location of the transceiver or control unit can affect safe operation of the vehicle. Follow these precautions when installing this transceiver:*

- Mount it where it does not interfere with operation of the vehicle controls and where the operator can easily see the display and reach the controls.
- Mount it where it is least likely to cause additional injury in case of an accident.
- Air bags deploy with great force. Therefore, do not mount a transceiver or control unit anywhere near the deployment area or place any other objects in the deployment area.

### 2.3.3 MOUNTING KITS

The following kits may be used to install this transceiver. Components in these kits are shown in Figures 2-1, 2-2, and 2-5.

#### Std Cable and Hardware Kit, Part No. 023-9750-010

Includes a 22-foot power cable, microphone hanger and ground wire, splice connectors, and all the hardware (such as screws) that is normally required for installation.

#### 100W Cable and Hardware Kit, P.N. 023-5315-100

Includes a heavy-duty 20-foot power cable, microphone hanger and ground wire, and all hardware (such as screws) that is normally required for installation.

#### Std Transceiver Mounting Kit, Part No. 023-9750-012

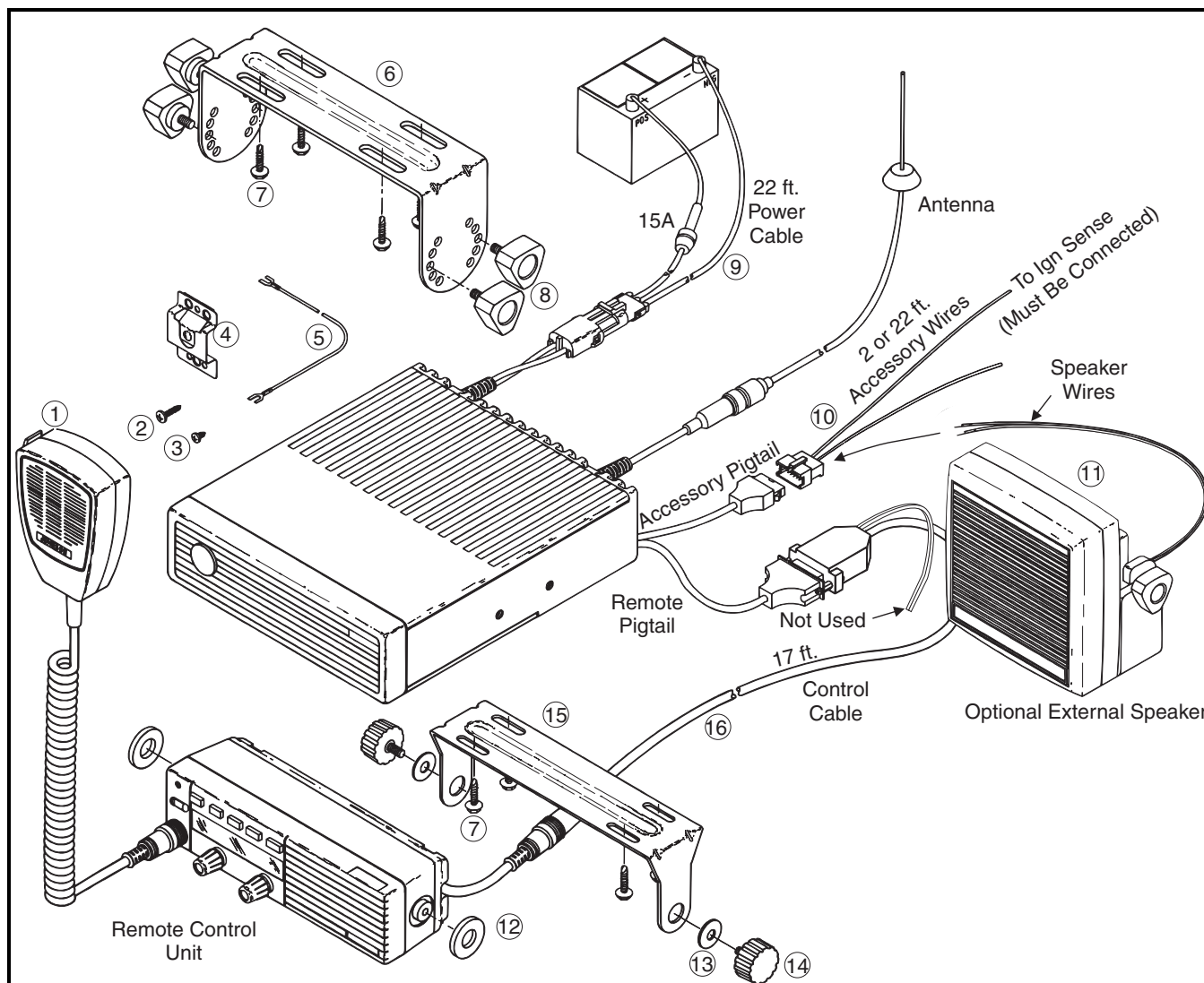
Includes a transceiver mounting bracket, four knobs, and mounting screws.

#### 100W Transceiver Mounting Bracket, Part No. 017-9700-008/009

Mounting bracket designed for the 100W radio with extended heat sink. The early -009 bracket can be attached to the bottom of the radio only, and the revised -008 bracket can be attached to the top or bottom to permit dash or overhead mounting.

#### Accessory Wire Kit, Part No. 023-9750-011

Includes a wire assembly that is used to connect the ignition sense input and accessories.



Item No.	Description	Part No.	Item No.	Description	Part No.
1	Amplified dynamic microphone	250-0740-310	8	Knob, transceiver (4)	547-0016-003
2	Screw, 4-20 x 5/8" thread formg (3)	575-5604-020	9	Power cable (22 ft.) and hardware	023-5315-100
3	Screw, 4-24 x 1/4" sheet metal (3)	575-3604-008	10	Accessory wire and hardware	023-9750-011
4	Microphone hanger clip	023-3514-001	11	5" 15W 3.2-ohm external speaker	250-0151-006
5	Mic hanger ground wire	023-7171-911	12	Plastic washer (2)	596-6400-015
6	Transceiver mounting bracket	017-2226-050	13	Stainless steel spring washer (2)	596-9260-001
7	Self drilling screw, 1.25" long		14	Knob, control unit (2)	032-0792-015
	Transceiver 1/4"	575-9077-565	15	Control unit mounting bracket	017-2226-050
	Control unit #10	575-9077-545	16	Control cable, 17 ft.	597-2002-262

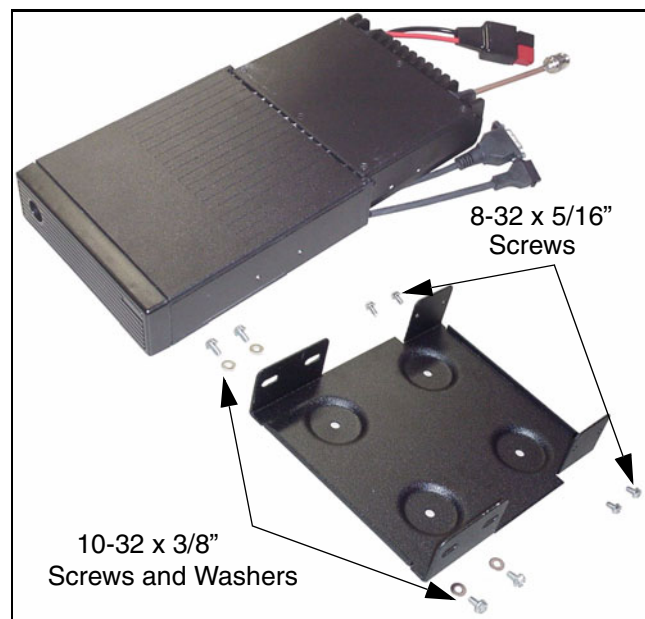
Figure 2-2 Standard Remote Mount Installation Components

### 2.3.4 MOUNTING STANDARD POWER TRANSCEIVER

Proceed as follows to mount a standard power front or remote mount transceiver:

1. Check the area underneath the selected mounting area for wiring, brake and gas lines, or other components that could be damaged when the mounting bracket is installed. Then install the mounting bracket using the included self-drilling screws or other screws if desired.
2. Install the transceiver in the bracket using the included knobs.
3. With front-mount transceivers, install the microphone hanger in a convenient location using the screws for sheet metal or plastic. The hanger must be connected to chassis ground for proper operation of functions such as monitoring and scan. If required, ground the hanger using the included ground wire.

### 2.3.5 MOUNTING 100W TRANSCEIVER



**Figure 2-3 100W Transceiver Mounting Bracket**

A longer bracket is required to install 100-watt transceivers because they have an extended heat sink. The -009 bracket is being replaced by the -008 bracket (see Section 2.3.3). The -009 bracket can be installed

on the bottom only (because the one set of mounting holes are offset), so it is intended for floor mounting. However, the -008 bracket has two sets of mounting holes to allow either top or bottom installation, so it can also be used for dash or overhead mounting. Refer to Figure 2-3 and proceed as follows to mount a 100W front or remote mount transceiver:

1. Check the area underneath the selected mounting area for wiring, brake and gas lines, or other components that could be damaged when the mounting bracket is installed. Then install the mounting bracket using the included self-drilling screws or other screws if desired.
2. Mount the transceiver in the mounting bracket using the screws shown in Figure 2-3.
3. If applicable, install the microphone hanger as described in the preceding section.

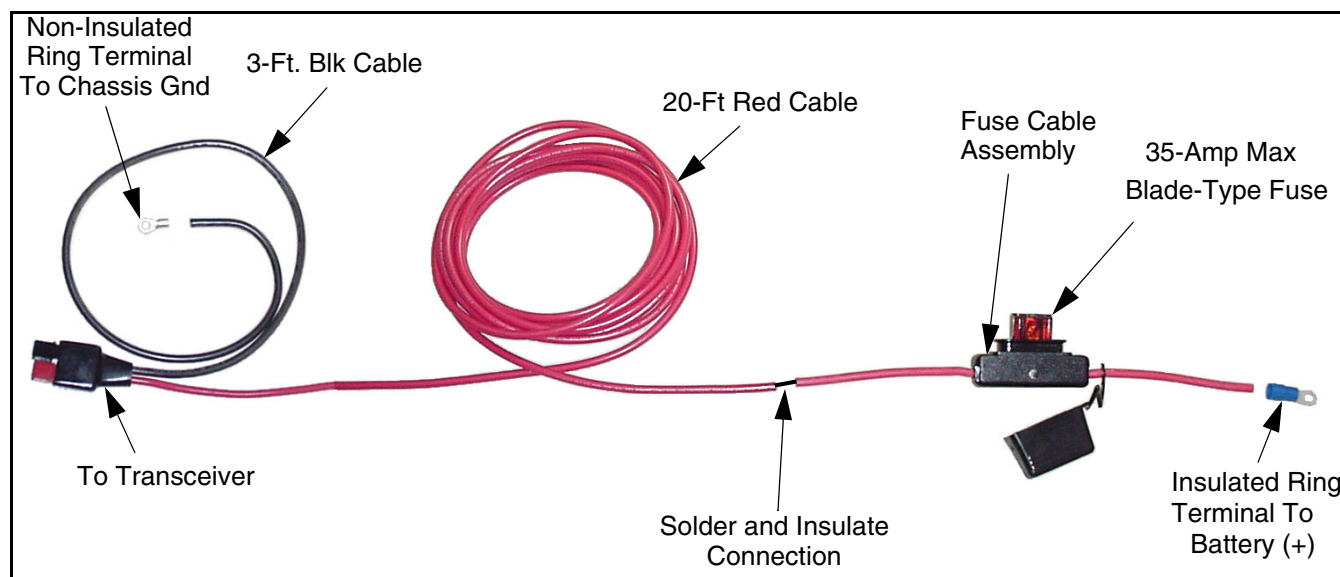
## 2.4 POWER CABLE INSTALLATION

*NOTE: As described in Section 2.1, it is recommended that the power cable be connected directly to the vehicle battery, and to an unswitched power source so that it de-affiliates when power is turned off.*

### 2.4.1 STANDARD MODELS (ALL EXCEPT 100W)

Refer to Figures 2-1 or 2-2 and proceed as follows:

1. Disconnect the negative cable from the battery to prevent damage from accidental short circuits.
2. Route the red and blue power cables to the battery. To minimize the chance of a short circuit occurring in the unfused portion of the cable, make sure the fuseholder is connected as close as possible to the positive battery terminal.
3. As described in Section 2.1, if there is excess cable, cut it to length. It may also be necessary to cut the cable if it must be routed through an opening that is not large enough to clear the fuseholder. Splice the wires by tightly wrapping them together and then soldering the connection (do not use a butt splice connector). Insulate the connection using electrical tape or heat shrink tubing.



**Figure 2-4 100W Transceiver Power Cable Components**

4. Connect the red power cable to the positive (+) terminal of the battery.
5. Connect the blue cable to the negative (–) battery terminal.
6. Plug the power cable into the transceiver and reconnect the negative battery cable.
7. Install the antenna according to the manufacturer's instructions (see Section 2.1). Check VSWR. Reflected power should be less than 4% of forward power (VSWR less than 1.5 to 1).

#### 2.4.2 100W MODELS

Refer to Figure 2-4 and the preceding guidelines and proceed as follows:

1. Disconnect the negative cable from the battery to prevent damage from accidental short circuits.
2. Route the red power cable to the vehicle battery.
3. Locate the included fuse cable and strip 1/2" of insulation from the battery end. Attach the included insulated ring terminal to this end using a suitable crimping tool and then solder the connection. Attach this ring terminal to the positive (+) battery terminal.
4. As described in Section 2.1, cut the red power cable from the transceiver to length and then splice it to the fuse cable by tightly wrapping the wires and then soldering the connection (do not use a butt splice connector). Insulate the connection using electrical tape or heat shrink tubing.
5. The 3-foot black cable at the transceiver end is connected to a chassis ground point. Locate a bolt or other chassis member that provides a good ground return to the negative battery terminal and then clean the area to ensure good contact. Cut the black cable to length, attach the included uninsulated ring terminal by crimping and soldering, and then attach it to chassis ground.
6. Plug the power cable into the transceiver and reconnect the negative battery cable.
7. Install the antenna according to the manufacturer's instructions (see preceding guidelines). Check VSWR. Reflected power should be less than 4% of forward power (VSWR less than 1.5 to 1).

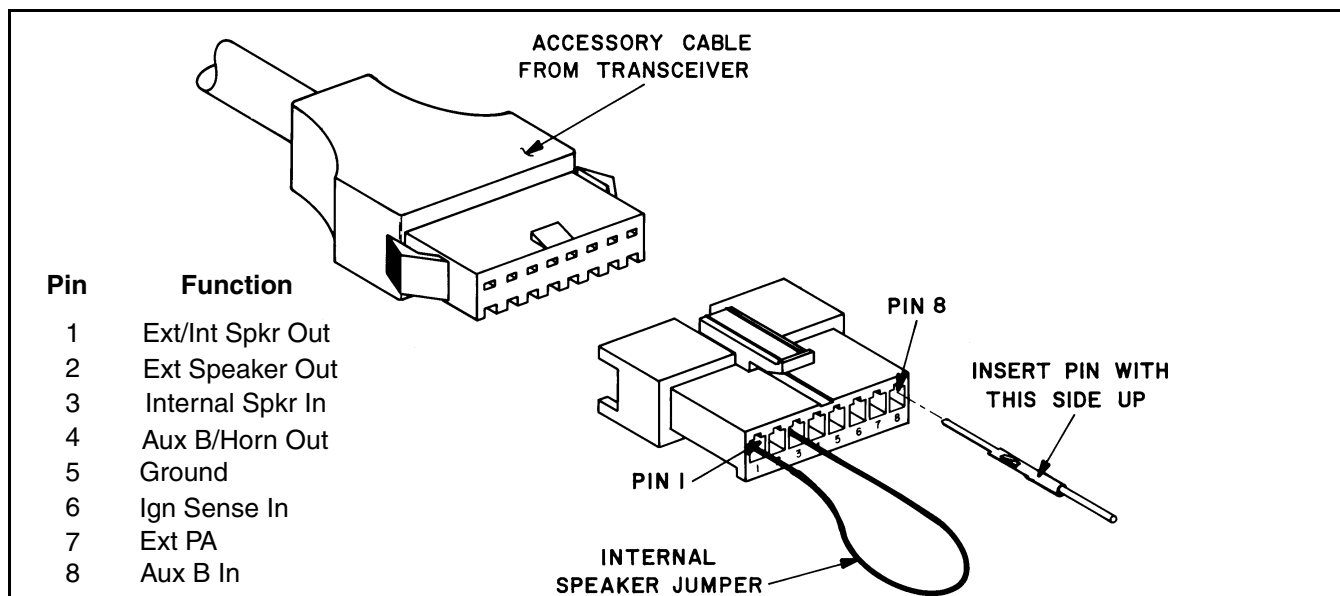


Figure 2-5 Accessory Jack

## 2.5 ACCESSORY CABLE INSTALLATION

*NOTE: The accessory cable ignition sense input must be connected for the transceiver to power up. Also, a speaker jumper may need to be installed to enable the internal speaker. Refer to the following for more information.*

### 2.5.1 GENERAL

Accessory Cable Kit, Part No. 023-9750-011, is standard and is used for connecting such things as the ignition sense line and external speaker to the accessory pigtail coming from the back of the transceiver.

Two 8-pin connectors are included in this kit. One has a jumper installed from pin 1 to 3 for routing audio back into the internal speaker (see Section 2.7) and the other does not have any wires installed. Also included are two 22-foot and three 2-foot wires with attached pins that can be used as required. Refer to Figure 2-5 and install this cable as described in the following information.

### 2.5.2 IGNITION SENSE INPUT (PIN 6)

*NOTE: As previously described, the ignition sense line must be connected to a switched or unswitched power source for the transceiver to power up.*

This ignition sense line is pin 6 of the accessory connector, and it is connected using an included wire assembly. When the ignition sense input is connected to a source switched by the vehicle ignition switch, it provides the following functions.

1. Power automatically turns on and off with the ignition switch.
2. A turn-off delay can be programmed (see Section 3) which may prevent accidental discharge of the vehicle battery if the transceiver is left on for extended periods (1 or 2 days). Standby current (power on, receiver squelched) is approximately 600 mA.

If these features are not used and transceiver power is to be controlled by the front-panel power switch only, the ignition sense input can be connected to an unswitched source.

### 2.5.3 SPEAKER PINS (PINS 1, 2, 3)

Refer to Section 2.7 for speaker installation information.

## 2.5.4 AUXILIARY B OUT (PIN 4)

### General

This output can be programmed for one of the following functions. The enabled condition is a low output and the disabled condition is a high impedance state. Maximum sink current is approximately 1.0 ampere, so a driver circuit may be required.

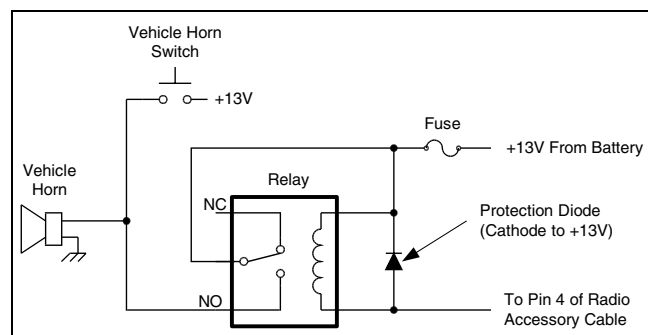
The Auxiliary B output is connected using one of the wires included in the accessory wire kit. Insert the pin of the wire assembly into the pin 4 slot of the connector as shown in Figure 2-5. Then connect the other end to the external device.

### Horn Alert

*NOTE: The horn alert feature is available only in later models with ARM firmware, Version 1.19 or later (and all Version 2.x and 3.x firmware).*

To utilize the horn alert, a Horn option switch, Cadence Style, and Auxiliary B Horn output must be programmed. Refer to Section 4.7 of the operating manual (see Section 3) and the programming manual referenced in Section 4 for more information. (The Aux B output is programmed on page 2 of the Global screen.)

When the horn alert sounds, pin 4 of the accessory connector goes low. If a relay is used, a diode should be connected across the relay coil with the cathode toward the battery side. This protects Q6 on the logic board from the voltage spike produced when the relay de-energizes. A horn circuit example is shown in Figure 2-6.



**Figure 2-6 Horn Circuit Example**

### Siren Backlight

The “Backlight” function of the Auxiliary B output is programmed when the optional siren is used. The siren control head backlight then turns on and off with the radio control head backlight. A separate siren control pigtail cable is installed and provides the Auxiliary B output signal to the siren controller (pin 4 of the accessory connector is not used).

### Site Trunking

The “Site Trunking” function of the Auxiliary B output provides an external indication such as a light when site trunking is occurring. This function is available with SmartZone and P25 trunked operation, and it requires PCConfigure Version 1.24 or later and radio firmware Version 2.4.x/3.4.x or later (it is not available with 1.x.x ARM firmware).

## 2.5.5 EXTERNAL PUBLIC ADDRESS (PIN 7)

An external public address system can be connected to pin 7 of the accessory connector. The PA option switch is required to control this feature. In the public address mode, microphone audio is always routed to the PA system, and the transceiver can be programmed so that receive audio is also routed. This is a low-level output, so some type of amplifier is required.

## 2.5.6 AUXILIARY B INPUT (PIN 8)

This input can be programmed for the following functions. This input is activated by a high voltage and deactivated by a low voltage or no signal (high impedance).

### External Emergency Switch

When this function is programmed, an emergency condition can be triggered using an external emergency switch such as a foot-operating type.

### PA Broadcast

This function is used with the optional Transit Bus PA system to allow an external public address select switch to be used instead of the normal front panel option switch.

## 2.6 REMOTE CONTROL UNIT INSTALLATION

*NOTE: Refer to Section 2.11 for handheld control unit installation information.*

### 2.6.1 GENERAL

The remote control configurations that may be used are as follows:

**Single Remote** - A remote control unit is connected to the remote mount radio (without operating controls). This configuration is shown in Figure 2-2.

**Single Remote, Dual Controls** - A remote control unit is connected to the front mount radio. This allows control from both the radio front panel and the remote control unit. This configuration is a combination of Figures 2-1 and 2-2.

**Dual Remotes** - Two remote control units are connected to a remote mount radio. This allows control from both remote control units. With this configuration, a second remote control unit pigtail is used. One pigtail is connected to J6 on the logic board and the other to J1. This configuration is similar to Figure 2-2.

Before installing the remote control units in the vehicle, check operation. If volume control is not operating as desired, some DIP switches inside the control unit may need to be reconfigured. Refer to the next section for more information.

***NOTE:** With dual control or remotes, for system power to turn off, the Power switches of both control units must be off. Since the selected mode is not indicated by the push button switch, it is recommended that only one control unit be used to switch power.*

### 2.6.2 CONTROL UNIT BOARD VERSIONS

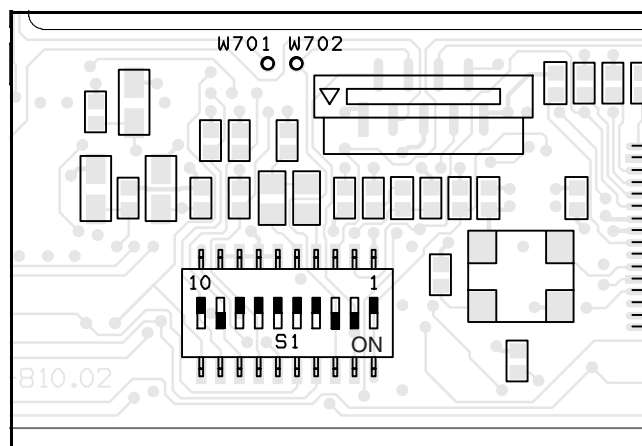
#### Revised Controller Board

There are two different display controller boards in use. Beginning in late 2001, a revised version started shipping that utilizes only DIP switches for programming. The earlier board used both DIP switches and jumpers. The new revised board is shown in Figure 2-7 and the early board is shown in

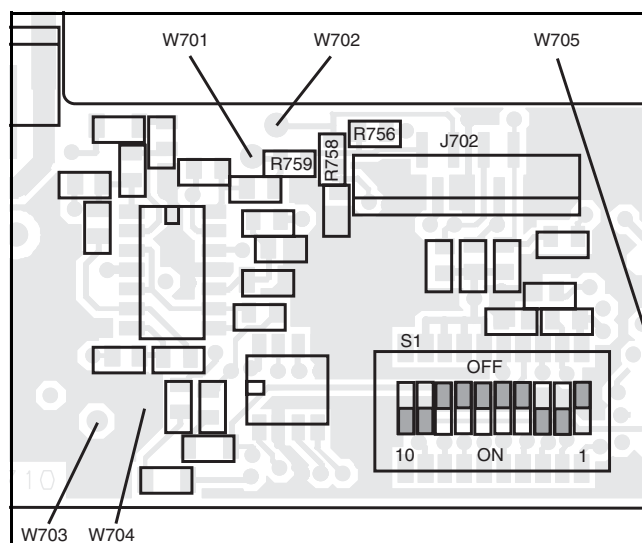
Figure 2-8. Compare the parts layout of your board to these illustrations to determine which board you have. The setup information which follows covers both configurations.

#### Revised Audio PA Board

There are also two different audio PA boards in use. Beginning in mid 2003, an revised version began shipping that has a 5-pin connector for connecting to the controller board. Previous versions were hard-wired to the controller board using separate wires. In addition, the revised version has some circuit changes that affect how S1-2 is set. The setup information which follows covers both configurations.



**Figure 2-7 Revised Display Controller Board**



**Figure 2-8 Unrevised Display Controller Bd**

**Table 2-1 Control Unit DIP Switch S1 Settings**

<b>Configuration</b> (see Section 2.6.1)	<b>Master/Slave Setting</b> (S1-8/S1-9) [1]	<b>Volume Control Setting</b> S1-2 [2]
<b>Front mount transceiver only</b>	Master*	Don't Care
<b>Remote control unit, single control</b> Standard internal speaker used Optional external speaker used	Master* Master*	On* [5] Don't Care [6]
<b>Dual control, standard configuration [3]</b> Front mount transceiver control unit Remote control unit	Master* Slave	Don't Care On* [5]
<b>Dual control, alternate configuration [4]</b> Front mount transceiver control unit Remote control unit	Slave Master*	Don't Care Don't Care [6]
<b>Dual Remotes, internal speakers used</b> Remote control unit 1 (either ctrl unit) Remote control unit 2 (other ctrl unit)	Master* Slave	On* [5] On* [5]
<b>Dual Remotes, one internal/one external speaker used</b> Control unit controlling ext speaker Remote control unit w/internal speaker	Master* Slave	Don't Care [6] On* [5]
<b>Handheld Control Unit, Dual Controls,</b> (HHC + front mt radio, single int/ext spkr avail.) Volume Controlling Unit Other Ctrl Unit	Master* Slave	N/A/Don't Care N/A/Don't Care
<b>Handheld Control Unit, Dual Remotes</b> (HHC + remote control unit, two speakers avail.) HHC (controls external speaker) Remote control unit (controls internal spkr)	Master* Slave	N/A On* [5]

\* - Default setting, no change usually required.  
 [1] Master = S1-8 Off/S1- 9 On; Slave = S1-8 On/S1-9 Off  
 [2] S1-3 is always On and S1-10 is always Off. With the revised display controller board (Figure 2-7), set using DIP switches S1-2, 3, and 10. With the unrevised display controller board (Figure 2-8), set using jumper resistors R756 (S1-2), R758 (S1-3), and R759 (S1-10). "On" = Jumper In, "Off" = Jumper Out.  
 [3] The volume of each internal speaker is controlled independently by the local volume control. If an external speaker is used, it is controlled by the front mount transceiver and the radio internal speaker is inactive.  
 [4] This configuration allows an external speaker to be controlled by the remote control unit. However, both internal speakers and the volume control of the front mount transceiver are then inactive.  
 [5] With unrevised audio PA board (see Section 2.6.4), S1-2 must be Off.  
 [6] When a remote control unit controls an external speaker and the internal speaker is not used, disable the internal speaker by disconnecting the internal PA board from the display controller board (see Section 2.6.4).



## Accessing Jumpers

The jumpers on the controller board are configured as described in the following information and in Table 2-1. If the default configuration must be changed, this board is accessed as follows:

1. Remove the back cover of the remote control unit. The audio PA board is the top board, followed by the display controller board, and then the display board.
2. To temporarily move the audio PA board out of the way to access the display controller board, release it from the housing by pressing the two plastic clips on the bottom edge.

## 2.6.3 SETTING MASTER/SLAVE SWITCHES

With two control units, the control unit designated as the Master controls the external or front mount radio speaker. Switches 8 and 9 of DIP switch S1 on the display controller board (see Figure 2-7 or 2-8) set the Master/Slave configuration of the control unit as follows. This switches function the same on both boards. Set these switches as indicated in Table 2-1 if applicable.

**Master** = Sw 8 Off, Sw 9 On (default)

**Slave** = Sw 8 On, Sw 9 Off

## 2.6.4 CONFIGURING VOLUME CONTROL

S1-2, 3, and 10 select the volume control mode. These switches can almost always be left in the default mode (S1-2 and 3 = On, S1-10 = Off). Additional information follows.

- If controlling an external speaker and the internal speaker is not used, disable the internal speaker by disconnecting the control unit audio PA board from the controller board.
- If controlling the local internal speaker when equipped with the unrevised audio PA board (hardwired to controller board), S1-2 = Off or R756 Out.

## 2.6.5 MOUNTING REMOTE CONTROL UNIT

A diagram showing a remote transceiver installation is located in Figure 2-2. The control unit

mounting bracket, 17-foot control cable, and mounting hardware are included. Proceed as follows:

1. Check the area behind the selected mounting location to make sure that there is nothing that will be damaged when the mounting screws are installed. Then install the mounting bracket using the included self-drilling screws or others if desired.
2. Install the control unit in the bracket using the included plastic washers, spring washers, and knobs as shown in Figure 2-2.
3. Install the microphone hanger in a convenient location using the included screws for sheet metal or plastic as applicable. The hanger must be connected to chassis ground for proper operation of functions such as monitoring and scan. If required, ground the hanger using the included grounding wire.
4. Route the control cable from the transceiver to the control unit and plug it into both as shown in Figure 2-2. With dual remotes, there are two remote pigtails coming from the back of the radio.

## 2.7 CONNECTING THE SPEAKER

### 2.7.1 USING STANDARD INTERNAL SPEAKER

#### CAUTION

*The audio amplifier in the transceiver is designed to withstand momentary grounding of the speaker outputs. However, do not connect either speaker output to supply voltage because serious damage will result.*

**Front Mount Transceiver** - Insert the plug with the jumper from pin 1 to 3 into the accessory jack (see Figure 2-5). This routes the audio on pin 1 back in to the internal speaker connected to pin 3. The other internal speaker terminal is internally connected to pin 2.

**Remote Control Unit** - In the standard configuration, the internal speaker in the control unit is used, and no special connections are required. Low level audio from the control cable is routed to a 3-watt audio amplifier in the control unit. The use of a separate amplifier permits independent volume control in dual control applications and also minimizes noise.

*NOTE: The two wires on the transceiver end of the control cable are not used in this application, so they should remain unconnected.*

## 2.7.2 USING AN OPTIONAL EXTERNAL SPEAKER

If an optional external speaker is used, it should be a 4-ohm, 15-watt speaker such Part No. 250-0151-006 shown in Figure 2-1 or 2-2. Proceed as follows to connect this speaker:

1. The external speaker is connected to pins 1 and 2 of the accessory connector shown in Figure 2-5 (the order is not important). If installing the -006 speaker, pins are already installed on the speaker wires. Locate the connector included in the accessory wire kit that does not have pins 1 and 3 jumpered and insert one pin into the pin 1 location and the other into the pin 2 location.
2. If installing some other speaker, use the 2- or 22-foot wire assemblies included in the accessory wire kit as required.

*NOTE: In dual control/remote applications, this speaker can be controlled by either the transceiver or remote control unit. Refer to Table 2-1 and Section 2.6 for information on how to set up the control unit for each configuration.*

## 2.8 KEY CAP INSTALLATION

Key Cap Kit, Part No. 587-5300-001, is included with each transceiver. This kit includes keys labeled as follows and six plugs that can be inserted in the front panel if keys are not used. The caps indicated by an asterisk ( \* ) are installed at the factory.

EMER*	BKLHT*	DISP*	SEL SQ*	SCAN*
TONES*	C/S	TG SEL	TX PWR	CALL
MON	RWS	PRI ED	ALERT	RESP
MSG	RTA	PHONE	STATUS	HOME
SCN ED	PROG	SEARCH	LOCK	F1
F2	OTAR	KY CHG	KY CLR	PUB AD
HORN	KY SEL	DATA	SN LST	SQ LST
SURVLC	TN VOL	CH SEL	PW CHG	RWS ED

Determine the function of each key and then install the applicable key cap. To remove a key cap, gently pull it out of the front panel with a wide-nose pliers or use the extraction tool included in the DC power cable kit. This kit is for the standard front or remote control unit only. The handheld control unit key caps cannot be changed.

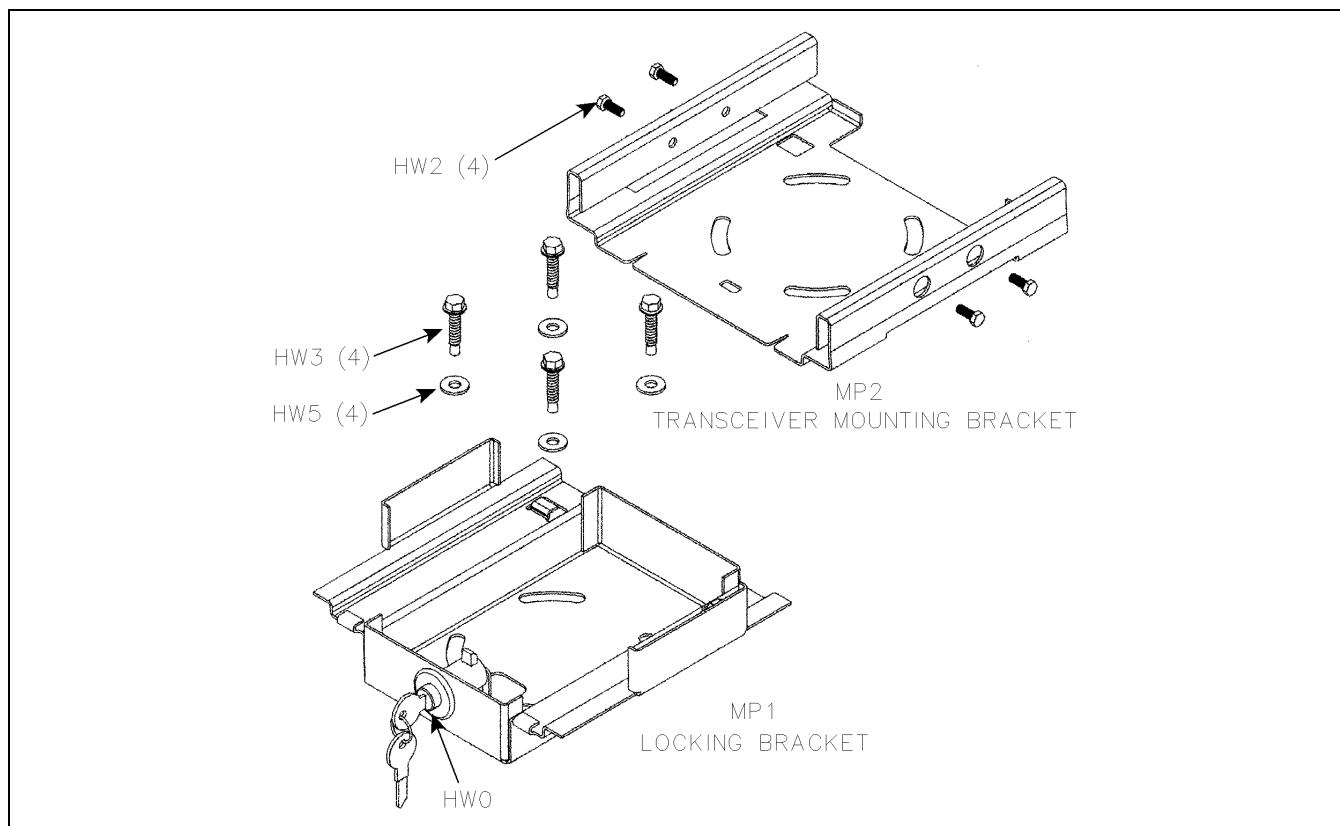
## 2.9 PIGTAIL CABLES

The various accessory pigtail cables that may be installed in the radio are listed in Table 2-2. This table indicates the internal logic board connector it plugs into and the external connector it provides.

**Table 2-2 53xx Mobile Pigtail Cable Guide**

Cable	Part Number	To Radio Logic Bd Connector	Connectors Provided By Cable						
			Accessory 8-pin	Remote 1 DB15 F	Remote 2 DB15 F	UDDI DB25 F	PVP Audio DB25 F	Serial Data DB9 F	Siren 8-pin
Accessory Std w/EMI board	597-2002-230 023-5300-630	J7, P101	X						
Remote 1/Acc	597-2002-249	J6, J7, P101	X	X					
Remote 2	597-2002-251	J1			X				
Dual Remote	597-2002-283	J1, J6		X	X				
UDDI	597-2002-245	J5, J8				X			
Acc/PVP Audio	597-2002-280	J5, J7, J8, P101	X				X		
Serial Data	597-2002-282	J12						X	
Siren	597-2002-231	J11, P102							X

[1] Uses front mount control head connector so this cable cannot be used with front mount radios.



**Figure 2-9 Locking Tray Installation Diagram**

## 2.10 TRANSCIEVER MOUNTING TRAY INSTALLATION

### 2.10.1 DESCRIPTION

Optional Transceiver Locking Tray, Part No. 585-7000-185, is a lockable mounting bracket for 5300 and other transceivers that use the standard chassis (it is not intended for 100W models with the extended chassis). This bracket provides theft protection and also allows the transceiver to be quickly removed from the vehicle with a key.

### 2.10.2 INSTALLATION

Refer to Figure 2-9 and proceed as follows:

1. Install the transceiver in bracket MP2 using the four 10-32 x 1/2" screws (HW2) included. If desired, this

mounting bracket can be used to mount the transceiver directly to the vehicle.

2. Install lock bracket MP1 using the four self-drilling screws (HW3) and washers (HW5) included. Make sure that there is nothing under the mounting location that will be damaged.

### 2.10.3 LOCKING/UNLOCKING TRANSCEIVER

To insert the transceiver with attached mounting bracket into the locking bracket, set it over the locking bracket and push it rearward slightly if necessary so that it seats. Then pull it forward until it latches. The lock operates in a manner similar to most glove compartment locks. To release the transceiver, press the button and at the same time push the transceiver rearward. The key locks the button so that it cannot be pressed.

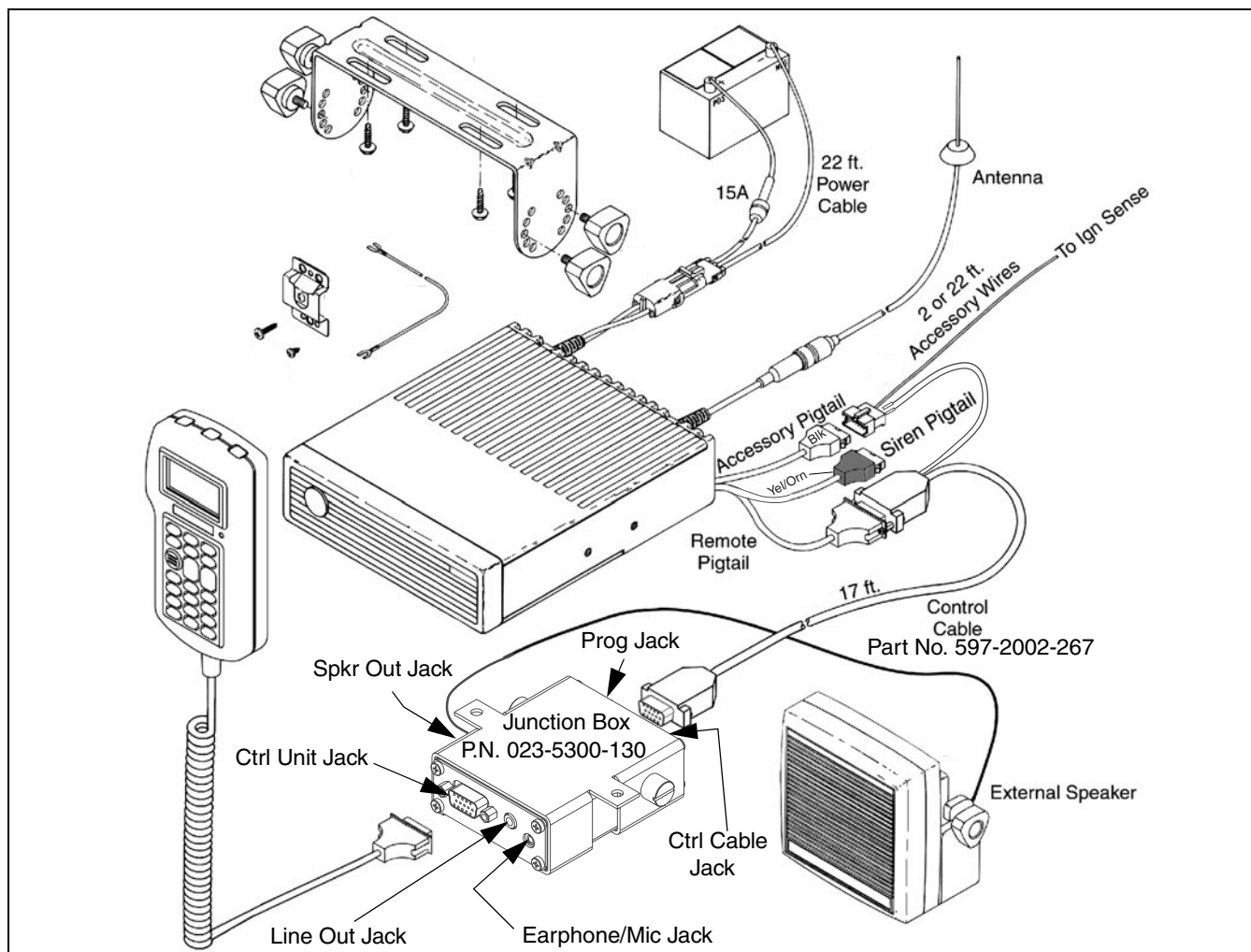


Figure 2-10 HHC Installation Components (Optional Junction Box Used)

## 2.11 HANDHELD CONTROL UNIT INSTALLATION

### 2.11.1 GENERAL

The Handheld Control Unit replaces the standard control unit and DTMF microphone in remote mount applications. It does not contain an internal speaker, so an external speaker must be used. This control unit plugs directly into the remote control unit pigtail cable on the back of the transceiver or into an optional junction box. This junction box provides the following additional jacks (see Figure 2-10).

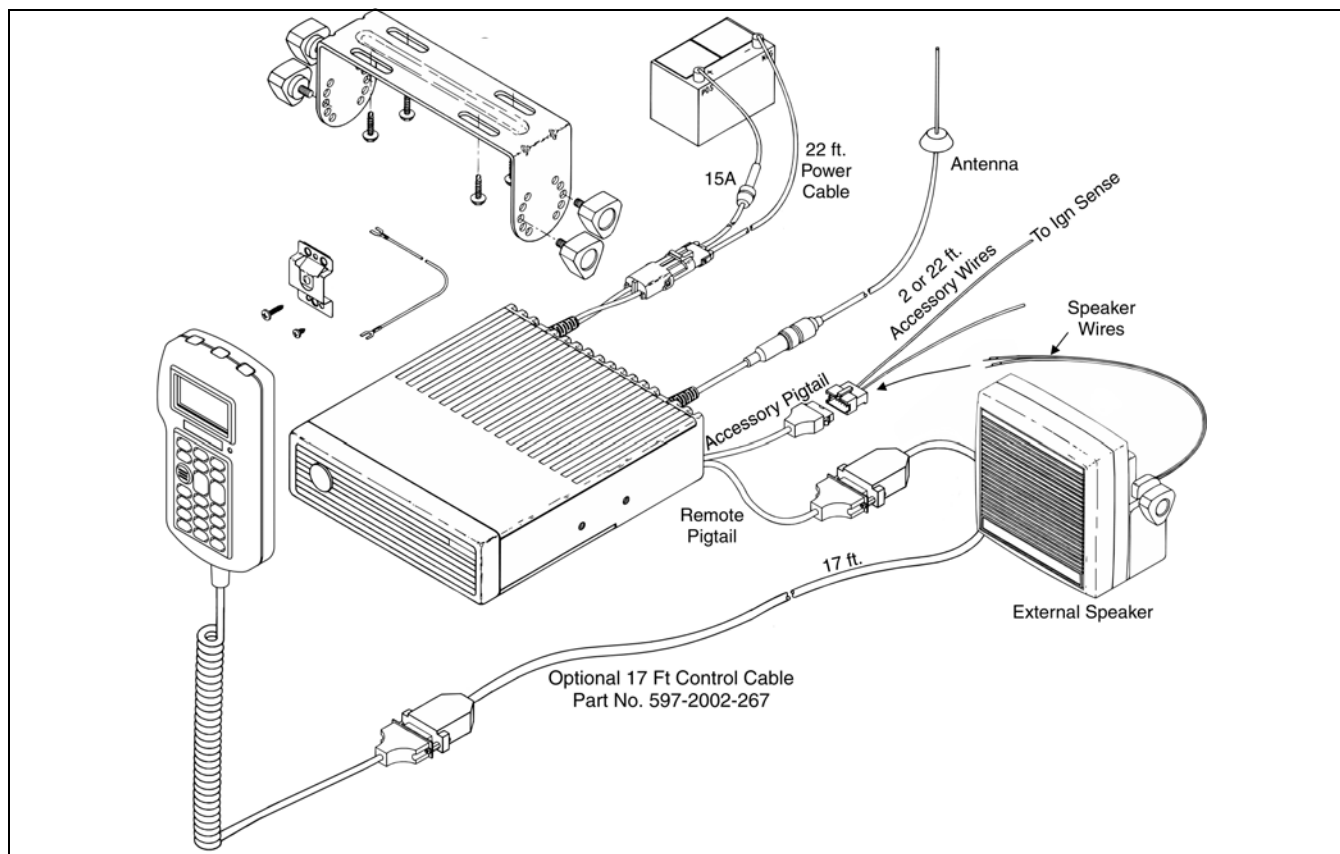
**Speaker Out Jack** - Output for connecting an external speaker. When the junction box is not used, the speaker is connected to the accessory pigtail of the transceiver.

**Line Out Jack** - Connection point for a tape recorder or some other device. The output signal at this jack is 1V P-P, 600-ohm (nominal), and consists of composite receive and transmit audio.

**Earphone/Microphone Jack** - A three-conductor jack for connecting a combination earphone and microphone. The external speaker audio is automatically muted when this jack is used. There is no PTT line associated with this jack, so the transmitter must still be keyed using the control unit PTT switch.

**Programming Jack** - A standard eight-pin jack for connecting the computer and RPI to program the transceiver.

*NOTE: The junction box is required to program the transceiver when this control unit is used.*



**Figure 2-11 HHC Installation Components (Junction Box Not Used)**

### 2.11.2 INSTALLATION INSTRUCTIONS

#### Optional Junction Box Used (Figure 2-10)

1. Install the transceiver as described in Sections 2.2 to 2.5. Connect the microphone hanger to chassis ground as described.
2. Mount the junction box in a convenient location near the control unit using the included mounting bracket and hardware.
3. Route the 17-ft. control cable from the transceiver to the junction box as shown in Figure 2-10. Connect it between the remote pigtail of the transceiver and the male DB9 jack of the junction box.
4. The two wires coming from the connector on the transceiver end of the control cable route speaker audio to the junction box. Insert the pins on these wires into the pins 1 and 2 slots of the accessory cable connector. *NOTE: The accessory and siren*

*pigtail cables have the similar connectors. Be sure to connect to the black accessory connector, not the yellow/orange siren connector.*

If a jumper has been connected between pins 1 and 3 on the accessory connector, remove it. A speaker can also be connected directly to pins 1 and 2 if desired. Refer to Section 2.7.2 for more information.

5. Plug the 4.0-ohm external speaker into the SPKR OUT jack of the junction box. Plug the control unit into the male DB9 connector of the junction box.
6. If applicable, connect the tape recorder or other device to the LINE OUT jack.
7. Connect the earphone or earphone/microphone to the EARPHONE/MIC jack (the external speaker automatically mutes when an earphone is connected to this jack). The earphone output is the “tip” of the jack and the microphone input is the “ring” (ground is the “sleeve”).

### Junction Box Not Used (Figure 2-11)

The Handheld Control Unit can be plugged directly into the remote pigtail of the transceiver in applications where the transceiver and control unit are located near each other.

In other applications where the transceiver is mounted remotely, optional 17-foot Control Cable, Part No. 597-2002-267, is required to connect the control unit to the transceiver. Proceed as follows:

1. Install the transceiver as described in Sections 2.2 to 2.5. Connect the microphone hanger to chassis ground as described.
2. Route the 17-ft. control cable from the remote pigtail of the transceiver to the control unit as shown in Figure 2-11. Secure the connectors using the captive screws.
3. Connect the external speaker to pins 1 and 2 of the accessory pigtail as described in step 4 of the preceding section.

### **2.11.3 USING HHC TO PROVIDE DUAL CONTROLS OR DUAL REMOTES**

#### Dual Control Configuration

The handheld control unit can be connected to a front mount transceiver to provide dual controls. However, operation in this configuration may not be suitable because only one speaker is available for both control units.

Either the internal speaker in the front mount radio or the external speaker connected to the accessory cable (see Section 2.7) or junction box can be used. Connecting both speakers in parallel is not recommended because the audio amplifier may become overloaded.

One control unit must be designated the Master and the other the Slave (see Section 2.6.3). The Master provides volume control. The other S1 switches should be left in the default configuration.

#### Dual Remote Configuration

Both the HHC and a remote control unit can be used to provide dual remote control units. The HHC is connected to one remote pigtail and the remote control unit is connected to the other. The HHC provides volume control of the external speaker and the remote control unit controls its local internal speaker.

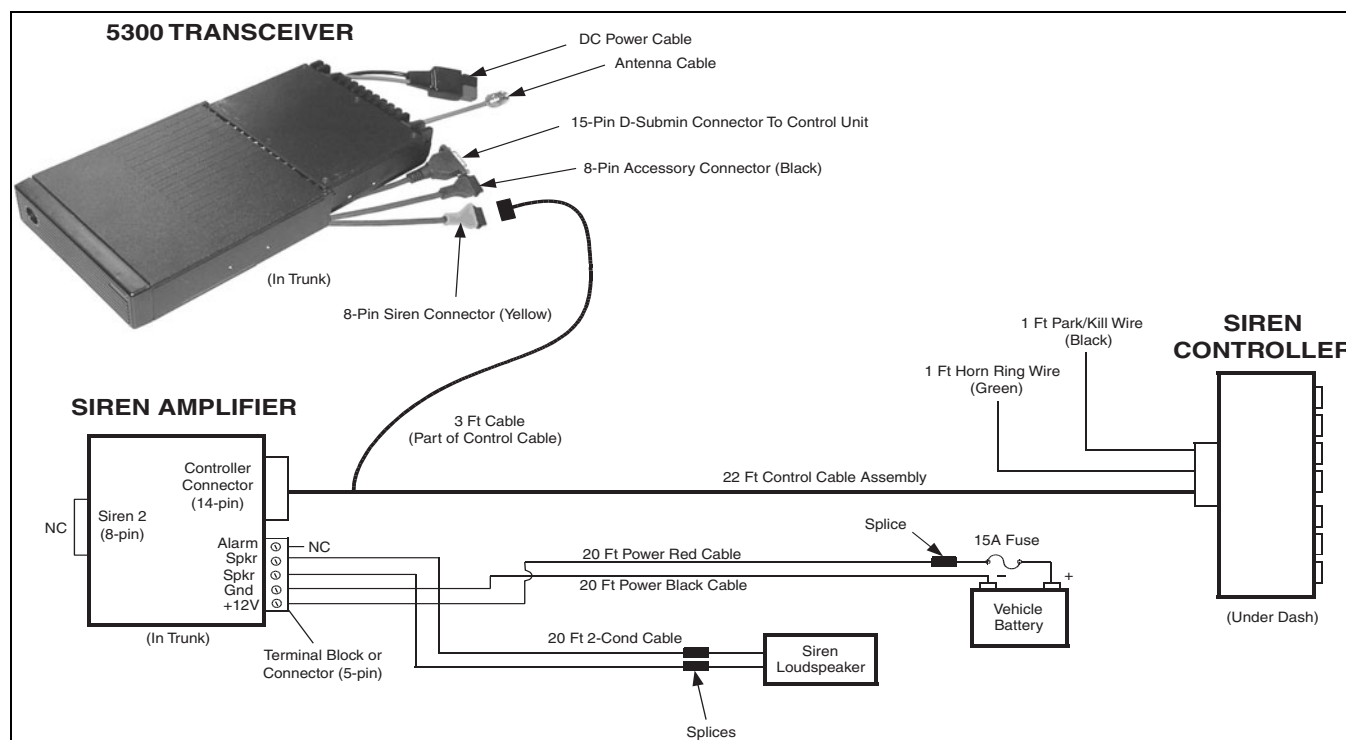
The HHC is designated the Master and the remote control unit the Slave (see Section 2.6.3). The remote control unit volume control switches should be left in the default configuration (see Section 2.6.4).

### **2.11.4 TRANSCIVER PROGRAMMING WITH HHC**

The programming setup used to program a transceiver equipped with the Handheld Control Unit is similar to that used with the standard control units. The programming cable is connected to the junction box using a special adapter. Refer to Section 4.1.4 for more information.

Only one transceiver programming parameter must be changed when the Handheld Control Unit is used. Set the “Controller Type” parameter on the Global screen of the PCConfigure programming software for “Handheld” instead of “Normal”.

4. There is also a DIP programming switch on the handheld controller board. Generally, the ten switches of this switch should be left in the default position which is switches 2, 3, 6, and 9 “On”, and the others “Off”. The only time any of these switches may need to be changed is when the HHC is used in a dual control or dual remote configuration as described in the preceding section.



**Figure 2-12 Siren Installation Diagram**

## 2.12 SIREN OPTION INSTALLATION INSTRUCTIONS

### 2.12.1 GENERAL

The 5300 Siren Kit, Part No. 250-5300-100, contains a siren amplifier, siren controller, and all the cables and hardware normally required to install this option. This kit connects to an E.F. Johnson 5300 mobile transceiver. The siren loudspeaker is optional, and the following models are available:

**Part No. 585-5300-007** - Model TS100 for light bar installation

**Part No. 585-5300-009** - Model MS100 for compact (behind grille) installation.

### 2.12.2 TRANSCEIVER PROGRAMMING

For proper operation of the siren controller backlight, a transceiver programming parameter may need to be changed. On the Global screen of the PCConfigure programming software (see Section 4), set the “Auxiliary B Toggle” parameter for “Backlight”. The

Siren Control Head backlight then turns on and off with the transceiver control unit backlight.

### 2.12.3 INSTALLATION PROCEDURE

Refer to Figure 2-12 and proceed as follows:

1. Mount the siren amplifier near the transceiver (the connecting cable to the transceiver is approximately 3 feet long).
2. Mount the siren controller in the desired location (the connecting cable to the amplifier is approximately 22 feet long).
3. Mount the siren loudspeaker in the desired location (the connecting cable to the amplifier is approximately 20 feet long). Refer to the installation instructions included with the speaker for more information.
4. Connect the included 22-ft control cable assembly between the amplifier, transceiver, and controller as shown in Figure 2-12. Be sure to connect it to the

yellow (or orange) 8-pin siren pigtail of the transceiver (not the black 8-pin accessory pigtail).

*NOTE: It is recommended that the power cable be connected directly to the vehicle battery. Connection to other locations may result in excessive noise in the audio signal when using the PA function.*

5. Connect the included fuseholder to the positive (+) battery terminal using the included ring terminal or another connector as required.
6. Connect the included red cable from the **+12V** terminal on the amplifier to the fuseholder using the included solder splice connector. This connector contains internal solder that melts when heated sufficiently.
7. Connect the included black cable from **GND** terminal on the amplifier to the negative (–) battery terminal using the included ring terminal or some other connector as required.
8. Connect the loudspeaker to the **SPEAKER** terminals on the amplifier using the included 2-conductor cable and solder splice connectors (the order is not important).
9. If the siren is to be automatically disabled when the vehicle is in Park or Neutral, connect the black wire coming from the siren controller connector to the neutral safety switch.
10. If the vehicle horn is to sound with the siren, connect the green wire coming from the siren control head connector to the vehicle horn circuit.



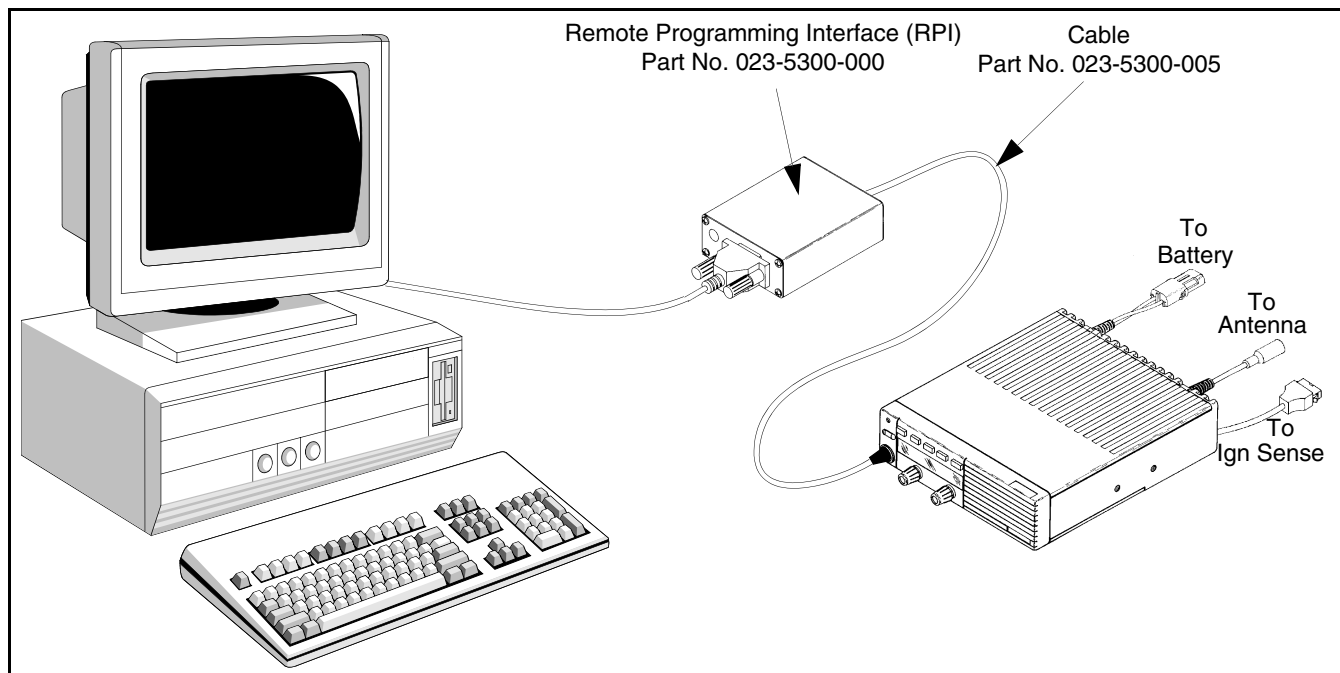
## SECTION 3 OPERATION

### 3.1 GENERAL

The operation description for the 5300 mobile transceiver is included on the CD-ROM with this manual. To open this manual, click the following link or go to the Op\_Man directory and open the file “5300\_Man.pdf”.

[Click here to go to the 5300 Operating Manual](#)

## SECTION 4 TRANSCEIVER PROGRAMMING



**Figure 4-1 Programming Setup (Standard Front/Remote Models)**

### 4.1 GENERAL

#### 4.1.1 PROGRAMMING SETUP

The following items are required to program the transceiver. The part numbers of this equipment are shown in Table 1-1 in Section 1. The programming setup is shown above.

- A Windows<sup>®</sup>-based computer (see next section)
- Remote Programming Interface (RPI), Part No. 023-5300-000
- Programming cable from RPI to transceiver (see Section 4.1.3 for more information).
- EFJohnson PCConfigure programming software, Part No. 023-9998-488.

*NOTE: The -005 cable, the -488 software, RPI, and a CD manual are included in the 5300 Series Programming Kit, Part No. 250-5000-004.*

#### 4.1.2 COMPUTER DESCRIPTION

The computer used to program this transceiver should meet the following minimum requirements:

- Windows 95/98/NT/2000 (3.1 cannot be used)
- Pentium<sup>®</sup> processor or equivalent
- 16 MB of RAM
- A hard disk drive with at least 5 MB of free space
- A CD-ROM drive
- An available serial port

#### 4.1.3 CONNECTING COMPUTER TO TRANSCEIVER

*NOTE: Only RPI, Part No. 023-5300-000, can be used to program the 5300-series transceiver. Other RPIs such as 023-9800-000 and 023-9750-000 are not compatible with this transceiver.*

##### Connecting RPI To Computer

The Radio Programming Interface (RPI) provides the required logic interface between the computer and transceiver. The cable from the RPI to computer is not included with the RPI. The RPI has a female DB9 connector, and most computer serial ports have a male DB9 or DB25 connector. Therefore, a male DB9 to female DB9 or DB25 is usually required. This is a standard cable available at most computer supply

stores or order 6 ft. DB9M to DB9F cable, Part No. 597-5900-002.

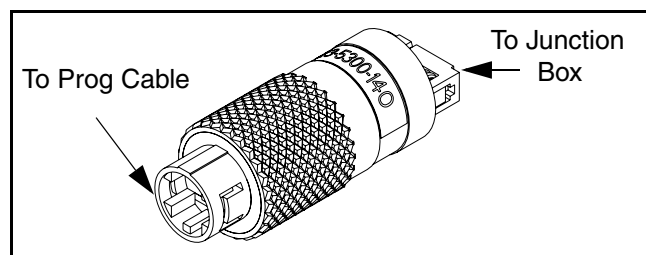
#### Connecting RPI To Transceiver

The programming setup for a front mount transceiver is shown in Figure 4-1. With transceivers that use the standard front or remote control unit, the cable from the RPI plugs into the microphone jack of the transceiver or control unit. This cable is Part No. 023-5300-005, and it is not included with the RPI. Connecting the programming setup to the handheld controller is described in the next section.

#### 4.1.4 HANDHELD CONTROLLER PROGRAMMING SETUP

When the Handheld Control Unit is used (see Section 3), the same computer, RPI, and programming cable are used as with the standard front and remote models. In addition, the following components are required:

- The junction box (Part No. 023-5300-130) is required to provide a connection point for the RPI since the control unit does not have a programming jack. This box may not be included with some handheld control units.
- Adapter Plug, Part No. 023-5300-140, is required to plug the 5300 programming cable into the rectangular 10-pin programming connector on the junction box (see following illustration).



Programming Adapter Plug

Only one transceiver programming parameter must be changed when the Handheld Control Unit is used. Set the “Controller Type” parameter on the Global screen of the PCConfigure programming software for “Handheld” instead of “Normal”.

#### 4.1.5 SIREN PROGRAMMING

When the optional siren feature is installed (see Section 2.12), one transceiver programming parameter may need to be changed for proper operation of the siren controller backlight. On the Global screen of the PCConfigure programming software, set the “Auxiliary B Toggle” parameter for “Backlight”. The Siren Control Head backlight then turns on and off with the transceiver control unit backlight.

#### 4.2 USING THE PCCONFIGURE SOFTWARE

The PCConfigure software is described in a separate CD-based manual included on the CD-ROM with this service manual and also the programming software. To open this manual, click the following link or go to the PCConfigure directory and open the file “Manual.pdf”.

[Click here to go to the PCConfigure manual](#)

## SECTION 5 CIRCUIT DESCRIPTION

### 5.1 GENERAL TRANSCEIVER DESCRIPTION

#### 5.1.1 INTRODUCTION

The E.F. Johnson 5300 is a microcontroller-based radio that uses a Digital Signal Processor (DSP) to provide the following modes of operation:

**Narrowband Analog** - FM modulation with a maximum deviation of 2.5 kHz. This mode is usually used in systems where the channel spacing is 12.5 kHz. Call Guard (CTCSS or DCS) subaudible squelch signaling can be used in this mode.

**Wideband Analog** - FM modulation with a maximum deviation of 5 kHz. This mode is usually used in systems where the channel spacing is 25 kHz or 30 kHz. Call Guard (CTCSS or DCS) subaudible squelch signaling can be used in this mode.

**Project 25 Digital** - The voice is digitized, error corrected, optionally encrypted and transmitted using C4FM modulation according to the Project 25 standard. This mode can be used in channel spacings of 12.5 kHz.

The DSP processes the received signals and generates the appropriate output signals. The microcontroller controls the hardware and provides an interface between hardware and DSP.

#### 5.1.2 PC BOARDS

The 5300-series mobile contains the following PC board assemblies:

**RF Board** - Contains the receiver, synthesizer, and exciter sections.

**PA Board** - Contains the transmitter power amplifier, power control, and main DC power switching sections.

**Logic Board** - Contains the digital signal processing (DSP), control logic, and audio processing sections.

**Interface Board** - A small board that provides the electrical connections between the logic and RF/PA

boards. It also contains the audio amplifier and volume control circuits for internal and external speakers.

**Display Controller** - Contains a microcontroller which provides an interface between the controller on the logic board and the front panel display and switches.

**Display Board** - Contains the liquid crystal display, option switch keypad, and display drivers. In addition, it contains the backlight for the display and keypad.

#### 5.1.3 CIRCUIT PROTECTION (FUSES)

Circuit protection is provided as follows:

- A 15-ampere fuse (35-ampere with 100W models) in the power cable provides overall transceiver protection.
- A 2-ampere fuse on the RF board protects circuits on that board.
- F1 (2-ampere) on the display controller board protects the Sw B+ output of the microphone connector.
- F1 on the logic board protects the Sw B+ output of universal interface connector J5.
- The various voltage regulators provide circuit protection by automatically limiting current.

*NOTE: The next two sections (5.1.4 and 5.1.5) describe operation with the revised logic (Version C in Section 1.12.2). Generally, the Digital IF chip on the revised RF board replaces the ABACUS chip on the early version, and the CODEC on the revised logic board replaces the ADSIC chip on the early version.*

#### 5.1.4 ANALOG MODE DESCRIPTION

##### Receive Mode

The signal is routed from the antenna connector to the RF Board where it is filtered, amplified, and mixed with the first local oscillator frequency generated by the synthesizer. The resulting IF signal is also filtered and amplified and sent to the AD9864 digital IF chip.

## UHF RF BOARD (VERSION C)

The signal is then mixed with the second local oscillator frequency to create a second IF signal. The second IF signal is then sampled and downconverted to baseband. The baseband signal is then decimated to a lower sample rate that is selectable at 20 kHz. This signal is then routed via a serial interface from the IF chip to the DSP on the logic board.

On the logic board the DSP digitally filters the input signal and performs frequency discrimination to obtain the message signal. The DSP first performs a carrier- detection squelch function on the radio. If a signal is determined to be present, the audio portion of the signal is resampled and then filtered appropriately. The filtered signal is then routed back to a D/A in the CODEC to produce an analog signal for output to the audio power amplifier and then the speaker. Any detected signaling information is decoded and the resulting information is sent to the microcontroller.

### Transmit Mode

The signal from the microphone is amplified and then routed to the CODEC chip where it is first digitized and then sent to the DSP. The DSP performs the required filtering, adds the desired signaling, converts the sample rate and then sends the resulting signal back to a D/A in the CODEC to produce the analog modulation signals for the VCOs. The modulated VCO signal is then sent to the RF power amplifier and transmitted.

## 5.1.5 PROJECT 25 DIGITAL MODE

### Introduction

In Project 25 Digital Mode, the carrier is modulated with four discrete deviation levels. These levels are  $\pm 600$  Hz and  $\pm 1800$  Hz. Digitized voice is created using an IMBE™ vocoder.

### Receive Mode

The signal is processed in the same way as an analog mode transmission until after the squelch function is performed. If a signal is detected to be present, the DSP resamples the signal from 20 kHz to 24 kHz. This is done so that the sample rate is an integer multiple (5x) of the data rate of the digital modulation which is 4800 symbols/sec (9600 bits/sec).

The resampled signal is then processed by a demodulator routine to extract the digital information. The resulting bit stream (9600 bps) is sent to a routine that performs unframing, error-correction, and voice decoding. The result of these operations is a reconstructed voice signal sampled at 8 kHz. The sampled voice signal is sent to a D/A in the CODEC to produce an analog signal for output to the audio power amplifier and speaker.

### Transmit Mode

The microphone signal is processed as in the analog mode until it reaches the DSP. At this point the audio signal is processed by a voice encoding routine to digitize the information. The resulting samples are then converted to a bit stream that is placed into the proper framing structure and error protected. The resulting bit stream has a bit rate of 9600 Hz.

This bit stream is then encoded, two bits at a time, into a digital level corresponding to one of the four allowable frequency deviations. This produces 16-bit symbols with a rate of 4800 Hz. The symbols are resampled to a rate of 48 kHz and filtered to comply with channel bandwidth requirements. The filtered signal is then sent to a D/A in the CODEC to produce the analog modulation signal for the VCO. The modulated VCO signal is then mixed up to the final transmit frequency and then sent to the RF PA for transmission.

## 5.2 UHF RF BOARD (VERSION C)

*NOTE: The following describes the new revised Version C RF board described in Section 1.12.1. The RF Board is not field serviceable. It must be replaced as a unit with a new board.*

### 5.2.1 RECEIVER

#### Front End Bandpass Filter

A harmonic filter is followed by a PIN diode transmit/receive switch. Following the switch, two fixed tuned bandpass filters are used in the front-end of the receiver. Depending on the desired receive band, the appropriate filter is selected using RF switches (U37/U41). This filter provides first-image rejection with minimal loss in order to provide the desired level

## UHF RF BOARD (VERSION C)

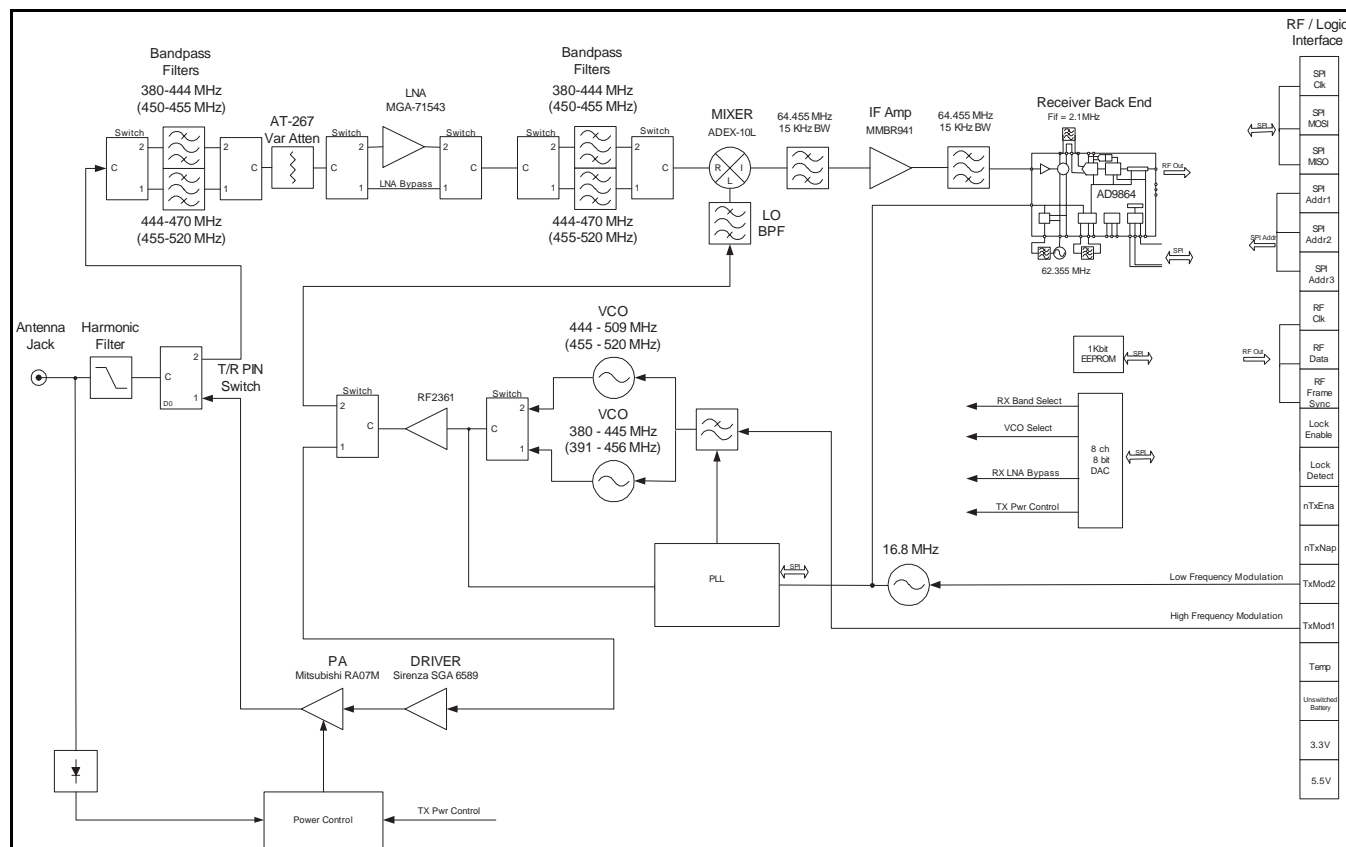


Figure 5-1 UHF RF Board Block Diagram (Version C)

of receiver sensitivity. A variable attenuator, which follows the filter, increases the dynamic range of the receiver when receiving high-level signals.

#### Front End LNA and Bypass Switching

The Low Noise Amplifier (LNA) is critical in determining the overall noise figure of the receiver chain. An MGA-71543 amplifier (U39) provides optimum noise figure, gain, intercept point, and power consumption.

#### Post-LNA Bandpass Filters

Additional bandpass filters are positioned after the LNA. These filters are identical to the front-end filters previously described. RF switches U42 and U40 are used to select between the two bands. These filters provide additional image rejection.

#### Mixer and LO Filter

A double-balanced, low-level ADEX-10L mixer (MX1) with a LO drive level of +4 dBm is used for the

first conversion. This mixer provides good dynamic range with a 3 dB lower LO drive than the more traditional +7 dBm drive mixers. This reduces power consumption and also the conducted and radiated local oscillator leakage from the receiver.

For the low band UHF version, a high-side mix is used for the 380-444 MHz receive band and a low-side mix is used for the 444-470 MHz receive band. For the high band UHF version, a high-side mix is used for the 450-455 MHz receive band and a low-side mix is used for the 455-520 MHz receive band. This band plan reduces the tuning range requirements for the VCOs.

A LO filter is used prior to LO port of the mixer to reduce the impact of wideband noise from the LO synthesizer on the receiver sensitivity.

#### IF Filter and Amplifier

A two-pole 64.455 MHz crystal filter (U2) is used to provide the desired level of adjacent channel rejection while providing minimal amplitude and phase distortion within a 25 KHz bandwidth. Shields

## UHF RF BOARD (VERSION C)

installed around the crystal filter provide sufficient isolation to meet the second image response specifications and minimize noise pickup by the impedance-matching inductors (L1, L2, L3, L4 and L7.)

A transistor IF amplifier (Q1 and supporting circuitry) is required to boost the signal strength, thereby reducing the overall noise figure. The noise figure, signal gain, intercept point, and power consumption are optimized in this design. An additional two-pole 64.455 MHz crystal filter (U25) is used to increase the adjacent channel rejection. An LC circuit provides the required impedance matching between the output of the IF filter and the input of the backend chip (U11.)

### Back End IC

An Analog Devices AD9864 IF Digitizing Subsystem IC (U11) provides a variety of functions for the receiver as follows:

Second Local Oscillator - A varactor-tuned transistor (Q2) oscillator is phase-locked to a fixed frequency of 62.355 MHz for converting the first IF of 64.455 MHz to a second IF frequency of 2.1 MHz. Phase Locked Loop circuitry inside of the AD9864 operates with a phase-detector frequency of 15 kHz.

Second Conversion Mixer and Filtering - A mixer inside the AD9864 converts from the first IF of 64.455 MHz to the second IF of 2.1 MHz. External filters (L29 and L30) provide IF bandpass filtering. Additional filtering is provided by the inherent operation of the sigma-delta analog/digital converters.

Gain Control - This device provides up to 12 dB of AGC range via a combination of analog and digital controls. Additionally, there is a 16 dB attenuator in the front end. The optimum settings are controlled by the host microprocessor.

Analog / Digital Conversion and Processing - Sigma-delta converters provide I and Q sampling directly from the second IF frequency. The resulting digital words are first filtered by internal programmable FIR filters and then clocked out of the AD9864 via a serial data bus using a programmable data rate.

## 5.2.2 SYNTHESIZER

### PLL IC

A CX72301 sigma-delta modulated PLL (U29) forms the basis of the main synthesizer that is used for both receive and transmit modes. This PLL chip provides good phase noise capabilities to reduce adjacent channel interference and quick switching between the receive and transmit modes.

In receive mode the PLL is programmed for a local oscillator frequency that is 64.455 MHz away from the receive frequency. In transmit mode the PLL is programmed directly for the transmit frequency.

### Reference Oscillator

A 16.8 MHz oscillator (Y1) is used as the frequency reference to the synthesizer and also to the receiver backend IC. The center frequency of this oscillator is corrected using a DC tuning voltage from the digital board during receive and voice and data modulation during transmit.

### Analog Switches and PLL Loop Filters

An analog switch (U17) provides quicker switching of signals during channel changes by varying the time constant of the PLL loop filter.

### VCOs

Two different VCOs minimize the tuning range of the VCOs in order to meet phase noise specifications. Both VCO's (U1 and U5) are used for transmit and receive modes. Their combined tuning range covers the entire transmit and receive frequency bands. Transmit modulation is provided to each oscillator's modulation port from the digital board.

A RF2361 buffer amplifier (U6) provides the required level of drive for the receiver mixer's local oscillator signal as discussed above.

## 5.2.3 TRANSMITTER

### Modulation

A “dual-port” modulation scheme is used in order to provide DC coupling of the signal required for data

## UHF RF BOARD (VERSION C)

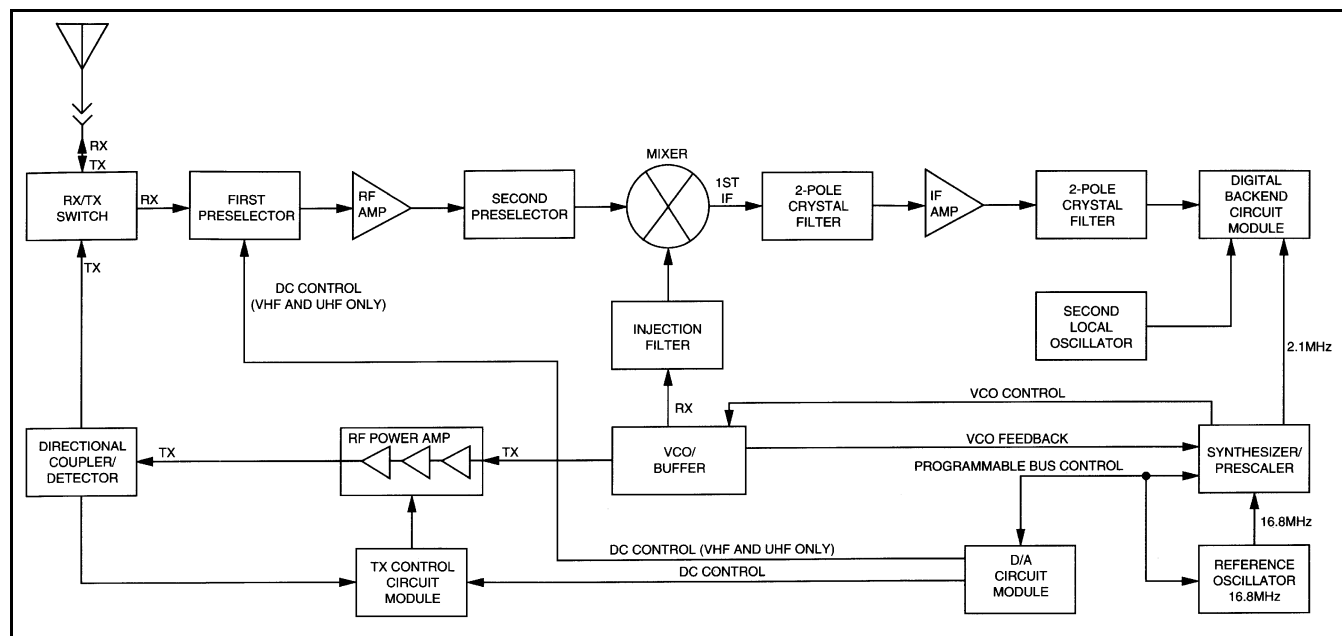


Figure 5-2 RF Board Block Diagram (Version A/B)

modulation applications. Modulation applied to the PLL's frequency reference provides low-frequency modulation, whereas modulation applied to the PLL's transmit VCO's (U1 and U5) provide high-frequency modulation. Signals for both modulation ports are provided from DACs on the digital board.

#### Power Amplifier

The power amplifier (U3) is a Mitsubishi RA07M4047M-01 module for the low band version and a Mitsubishi RA07M4452M-01 module for the high band version. The PA module provides the desired RF power output level and is stable over a wide range of VSWR conditions. The PA is driven by a SGA-6589 driver (U20) that typically provides +21 dBm output power. The PA is turned on and off by switching the power to this driver via transistor D10.

#### ALC

To maintain the specified Transmitter output power level, Automatic Level Control (ALC) is provided to control the drive level to the PA. The detected forward power is compared to a reference level provided by the digital board via op amp U21A. The resulting error voltage is applied to a power level control port of the power amplifier module. Trans-

mitter on/off splatter filtering is provided by an RC network (R76, R109, C267 and C141.)

#### T/R Switching and Harmonic Filter

The output of the power amplifier is applied to the transmit/receive RF PIN switch (D12 & D13.) This is a high dynamic-range switch that is capable of passing the desired transmit power with minimal compression. Any harmonics generated by the PA module and the RF T/R switch are filtered by a harmonic filter that is between the RF T/R switch and the antenna jack.

### 5.3 VERSION A/B RF BOARD OVERVIEW

*NOTE: The following describes the earlier A and B RF boards (see Section 1.12.1). The RF board is not field serviceable and must be replaced as a unit with a new board.*

The receiver front end consists of a preselector, an RF amplifier, a second preselector, and a mixer (see Figure 5-2). Both preselectors on the VHF and UHF boards are varactor-tuned, two-pole filters controlled by the control logic. The 800 MHz board uses stripline technology for the preselector. The RF amplifier is a dual-gate, gallium-arsenide based IC. The mixer is a



## VHF/UHF RF BOARD (VERSION A/B)

double-balanced, active mixer coupled by transformers. Injection is provided by the VCO through an injection filter. Refer to Table 5-1 for local oscillator (LO) and first IF information.

The frequency generation function is performed by three ICs and associated circuitry. The reference oscillator provides a frequency standard to the synthesizer/prescaler IC which controls the VCO IC. The VCO IC actually generates the first LO and transmit-injection signals and buffers them to the required power level. The synthesizer/prescaler circuit module incorporates frequency-division and comparison circuitry to keep the VCO signals stable. The synthesizer/prescaler IC is controlled by the control logic through a serial bus. Most of the synthesizer circuitry is enclosed in rigid metal cavities to reduce microphonic effects.

**Table 5-1 LO and First IF Frequencies**

	VHF	UHF	800 MHz
LO Frequency range	181.15 - 219.15 MHz	329.65 - 446.65 MHz	776.65 - 796.65 MHz
First IF Frequency	45.15 MHz	73.35 MHz	73.35 MHz

The receiver back end consists of a two-pole crystal filter, an IF amplifier, a second two-pole crystal filter, and the digital back-end IC (ABACUS). The two-pole filters are wide enough to accommodate 5 kHz modulation. Final IF filtering is done digitally in the ADSIC.

The digital back-end IC (ABACUS) consists of an amplifier, the second mixer, an IF analog-to-digital converter, a baseband down-converter, and a 2.4 MHz synthesis circuit. The second LO is generated by discrete components external to the IC. The output of the ABACUS IC is a digital bit stream that is current driven on a differential pair for a reduction in noise generation.

The transmitter consists of an RF power amplifier IC that gets an injection signal from the VCO. Transmit power is controlled by two custom ICs that monitor the output of a directional coupler and adjust PA control voltages correspondingly. The signal passes through a Rx/Tx switch that uses PIN diodes to automatically provide an appropriate interface to transmit or receive signals.

## 5.4 VHF/UHF RF BOARD (VERSION A/B)

*NOTE: The following describes the earlier Version A and B RF boards described in Section 1.12.1. The RF board is not field serviceable and must be replaced as a unit if it is defective.*

### 5.4.1 FREQUENCY GENERATION UNIT (FGU)

The frequency generation unit (FGU) consists of three major sections: the high stability reference oscillator (U203), the fractional-N synthesizer (U204,) and the VCO buffer (U201). A 5V regulator (U202), supplies power to the FGU. The synthesizer receives the 5V REG at U204, and applies it to a filtering circuit within the module and capacitor C253. The well-filtered 5-volt output at U204, pin 19 is distributed to the Tx and Rx VCOs and the VCO buffer IC.

The mixer's LO injection signal and transmit frequency are generated by the Rx VCO and Tx VCO, respectively. The Rx VCO uses an external active device (Q202), whereas the VHF Tx VCO's active device is a transistor inside the VCO buffer. The UHF Tx VCO uses two active devices, one external (Q203) and the other internal to the VCO buffer. The base and emitter connections of this internal transistor are pins 11 and 12 of U201.

The Rx VCO is a Colpitts-type oscillator, with capacitors C235 and C236 providing feedback. The Rx VCO transistor (Q202) is turned on when pin 38 of U204 switches from high to low. The Rx VCO signal is received by the VCO buffer at U201, pin 9, where it is amplified by a buffer inside the IC. The amplified signal at pin 2 is routed through a low-pass filter (L201 and associated capacitors) and injected as the first LO signal into the mixer (U2, pin 8). In the VCO buffer, the Rx VCO signal (or the Tx VCO signal during transmit) is also routed to an internal prescaler buffer. The buffered output at U201, pin 16 is applied to a low-pass filter (L205 and associated capacitors). After filtering, the signal is routed to a prescaler divider in the synthesizer at U204, pin 21.

The divide ratios for the prescaler circuits are determined from information stored in memory during programming. The microcontroller extracts data for the division ratio as determined by the selected channel and sends that information to a comparator in the synthesizer via a bus. A 16.8 MHz reference oscil-

## VHF/UHF RF BOARD (VERSION A/B)

lator, U203, applies the 16.8 MHz signal to the synthesizer at U204 pin 14. The oscillator signal is divided into one of three pre-determined frequencies. A time-based algorithm is used to generate the fractional-N ratio.

If the two frequencies in the synthesizer's comparator differ, a control (error) voltage is produced. The phase detector error voltage (V control) at pins 31 and 33 of U204 is applied to the loop filter consisting of resistors R211, R212, and R213, and capacitors C244, C246, C247, and C248. The filtered voltage alters the VCO frequency until the correct frequency is synthesized. The phase detector gain is set by components connected to U204, pins 28 and 29.

In the Tx mode, U204, pin 38 goes high and U201, pin 14 goes low, which turns off transistor Q202 and turns on the internal Tx VCO transistor in U204 and the external Tx VCO buffer Q203 on the UHF circuit. The Tx VCO feedback capacitors are C219 and C220. Varactor diode CR203/CR207 sets the Tx frequency while varactor CR202 is the Tx modulation varactor.

The modulation of the carrier is achieved by using a two-port modulation technique. The modulation of low frequency tones is achieved by injecting the tones into the A/D section of the fractional-N synthesizer. The digitized signal is modulated by the fractional-N divider, generating the required deviation. Modulation of the high-frequency audio signals is achieved by modulating the varactor (CR203) through a frequency compensation network. Resistors R207 and R208 form a potential divider for the higher-frequency audio signals.

In order to cover the very wide bandwidths, positive and negative V-control voltages are used. High control voltages are achieved using positive and negative multipliers. The positive voltage multiplier circuit consists of components CR204, C256, C257, and reservoir capacitor C258. The negative multiplier circuit consists of components CR205, CR206, C266, C267, and reservoir capacitor C254.

Out-of-phase clocks for the positive multiplier appear at U204, pins 9 and 10. Out-of-phase clocks for the negative multiplier appear at U204, pins 7 and 8, and only when the negative V-control is required (that is, when the VCO frequency exceeds the crossover

frequency). When the negative V-control is not required, transistor Q201 is turned on, and capacitor C259 discharges. The 13V supply generated by the positive multiplier is used to power-up the phase detector circuitry. The negative V-control is applied to the anodes of the VCO varactors.

The Tx VCO signal is amplified by an internal buffer in U201, routed through a low pass filter and routed to the Tx PA module, U105, pin 1. The Tx and Rx VCOs and buffers are activated via a control signal from U204, pin 38.

The reference oscillator supplies a 16.8 MHz clock to the synthesizer where it is divided down to a 2.1 MHz clock. This divided-down clock is fed to the ABACUS IC (U401), where it is further processed for internal use.

### 5.4.2 ANTENNA SWITCH

The antenna switch is a current device consisting of a pair of diodes (CR108/ CR109) that electronically steer RF between the receiver and the transmitter. In the transmit mode, RF is routed through transmit switching diode CR108, and sent to the antenna. In the receive mode, RF is received from the antenna, routed through receive switching diode CR109, and applied to the RF amplifier Q1 (VHF) or U1 (UHF). In transmit, bias current, sourced from U101, pin 21, is routed through L105, U104, CR108, and L122 (VHF) and L105, CR108, and L122 (UHF). Sinking of the bias current is through the transmit ALC module, U101, pin 19. In the receive mode, bias current, sourced from switched B+, is routed through Q107 (pin 3 to pin 2), L123 (UHF), L121, CR109, and L122. Sinking of the bias current is through the 5-volt regulator, U106, pin 8.

### 5.4.3 RECEIVER FRONT END

The RF signal is received by the antenna and coupled through the external RF switch. The UHF board applies the RF signal to a low-pass filter consisting of L126, L127, L128, C149, C150, and C151. The VHF board bypasses the low-pass filter. The filtered RF signal is passed through the antenna switch (CR109) and applied to a bandpass filter consisting of (VHF) L11 - L14, CR1 - CR9, C4, C2, and C3 or (UHF) L30, L31, L32, L34, L35, CR6 - CR9, C1, C2, and C3. The bandpass filter is tuned by

## VHF/UHF RF BOARD (VERSION A/B)

applying a control voltage to the varactor diodes in the filter (CR1 - CR9 VHF and CR6 - CR9 UHF).

The bandpass filter is electronically tuned by the D/A IC (U102), which is controlled by the microcomputer. The D/A output range is extended through the use of a current mirror consisting of Q108 and R115 and R116. When Q108 is turned on via R115, the D/A output is reduced due to the voltage drop across R116. Depending on the carrier frequency, the microcomputer will turn Q108 on or off. Wideband operation of the filter is achieved by retuning the bandpass filter across the band.

The output of the bandpass filter is applied to wideband GaAs RF amplifier IC U1 (UHF) or active device Q1 (VHF). The RF signal is then further filtered by a second broadband, fixed-tuned, bandpass filter consisting of C6, C7, C8, C80, C86, C87, C88, C97, C99, L3, L4, L5, and L30 (VHF) or C4 -C7, C88 - C94, C99, and L11 - L15 (UHF) to improve the spurious rejection.

The filtered RF signal is routed through a broadband 50-ohm transformer (T1) to the input of a broadband mixer/buffer (U2). Mixer U2 uses GaAs FETs in a double-balanced, Gilbert Cell configuration.

The RF signal is applied to the mixer at U2 pins 1 and 15. An injection signal (1st LO) of about -10 dBm supplied by the FGU is applied to U2, pin 8. Mixing of the RF and the 1st LO results in an output signal that is the first IF frequency. The first IF frequency is 45.15 MHz for the VHF band and 73.35 for the UHF band. High side injection is used for VHF and low side for UHF. The first IF signal output at U2, pins 4 and 6 is routed through transformer T2 and impedance matching components, and applied to a two-pole crystal filter (FL1), which is the final stage of the receiver front end. The two-pole crystal filter removes unwanted mixer products. Impedance matching between the output of the transformer (T2) and the input of the filter (FL1) is accomplished by C605 and L605 (VHF) or C611, C614, and L605 (UHF).

### 5.4.4 RECEIVER BACK END

The output of crystal filter FL1 is matched to the input of IF buffer amplifier transistor Q601 by C610 and L604 (VHF) and C609, C610, and L600 (UHF).

Transistor Q601 is biased by the 5V regulator (U202). The IF frequency on the collector of Q601 is applied to a second crystal filter through a matching circuit. The second crystal filter (FL2) input is matched by C604, C603, and L601 (VHF) and C604, L601, and L602 (UHF). The filter supplies further attenuation at the IF sidebands to increase the radios selectivity. The output of FL2 routed to pin 32 of U401 through a matching circuit which consists of L603, L606, and C608 (VHF) and L603, C606, and C605 (UHF).

In the ABACUS IC (U401), the first IF frequency is amplified and then down-converted to the second IF frequency of 450 kHz. At this point, the analog signal is converted into two digital bit streams by a sigma-delta A/D converter. The bit streams are then digitally filtered, mixed down to baseband, and filtered again. The differential output data stream is then sent to the logic board where it is decoded to produce the recovered audio.

The ABACUS IC (U401) is electronically programmable. The amount of filtering, which is dependent on the radio channel spacing and signal type, is controlled by the microcontroller. Additional filtering, which used to be provided externally by a conventional ceramic filter, is replaced by internal digital filters in the ABACUS IC. The ABACUS IC contains a feedback AGC circuit to expand the dynamic range of the sigma-delta converter. The differential output data contains the quadrature (I and Q) information in 16-bit words, the AGC information in a 9-bit word, imbedded word sync information, and fill bits dependent on sampling speed. A fractional N synthesizer is also incorporated on the ABACUS IC for 2nd LO generation.

The 2nd LO/VCO is a Colpitts oscillator built around transistor Q401 (VHF) or Q1 (UHF). The VCO has a varactor diode, VR401 (VHF) or CR5 (UHF) to adjust the VCO frequency. The control signal for the varactor is derived from a loop filter consisting of C426, C428, and R413.

### 5.4.5 TRANSMITTER

The transmitter consists of three major sections:

- Harmonic Filter
- RF Power Amplifier Module
- ALC Circuits

**VHF/UHF RF BOARD (VERSION A/B)**Harmonic Filter

With VHF versions, RF from PA module U105 is routed through coupler U104 and passed through the harmonic filtering network to antenna switch CR108. With UHF versions, RF from the PA module U105 is routed through coupler U104 and passed through transmit antenna switch CR108 and applied to a harmonic filtering network. The harmonic filtering circuit is composed of (VHF) L126, L127, L128, C149, C150, and C151 or (UHF) L126, L127, L128, C129, C130, C149, C150, and C151. Resistor R117 (VHF) or R117 (UHF) provides a current-limited 5V to J2.

RF Power Amplifier Module

RF power amplifier module U105 is a wide-band, three-stage (VHF) or four-stage (UHF) amplifier. Nominal input and output impedance of U105 is 50 ohms. The DC bias for U105 is on pins 2, 4, 5. In the transmit mode, the voltage on U105, pins 2 and 4 (close to the B+ level) is obtained via switching transistor Q101. Transistor Q101 receives its control base signal as follows:

- The microcomputer keys the D/A IC to produce a ready signal at U 102 pin 3,
- the ready signal at U102 pin 3 is applied to the Tx ALC IC at U101 pin 14 (5V), and
- the synthesizer sends a LOC signal to the Tx ALC IC (U204 pin 40 to U101 pin 16).

When the LOC signal and the ready signal are both received, the Tx ALC IC (pin 13) sends a control signal to turn on transistor Q101.

ALC Circuits

Coupler module U104 samples the forward and reverse power of the PA output voltage. Reverse power is present when there is other than 50 ohms impedance at the antenna port. Sampling is achieved by coupling some of the forward and/or reverse power, and applying it to CR102 (VHF) or CR101 (UHF) and CR103 for rectification and summing. The resultant DC signal is then applied to the Tx ALC IC (U101, pin 2) as RFDET to be used as an RF strength indicator.

**800 MHz RF BOARD (VERSION A/B)**

The transmit ALC circuit, built around U101, is the heart of the power control loop. Circuits in the Tx ALC module compare the signals at U101, pins 2 and 7. The resultant signal, C BIAS, at U101, pin 4 is applied to the base of transistor Q110. In response to the base drive, transistor Q110 varies the DC control voltages applied to the RF PA at U105, pin 3, thus controlling the RF power of module (U105).

Thermistor RT101 senses the temperature of the Tx ALC IC. If an abnormal operating condition exists that causes the PA temperature to rise to an unacceptable level, the thermistor forces the ALC to reduce the set power.

**5.5 800 MHz RF BOARD (VERSION A/B)**

*NOTE: The following describes the earlier Version A and B RF boards described in Section 1.12.1. The RF Board is not field serviceable and must be replaced as a unit if it is defective.*

**5.5.1 FREQUENCY SYNTHESIS**

The complete synthesizer subsystem consists of the reference oscillator (U304), the voltage-controlled oscillator (VCO U307), a buffer IC (U303), and the synthesizer (U302).

The reference oscillator contains a temperature-compensated 16.8 MHz crystal. This oscillator is digitally tuned and contains a temperature-referenced, five-bit, analog-to-digital (A/D) converter. The output of the oscillator (pin 10 on U304) is applied to pin 14 (XTAL1) on U302 through capacitor C309 and resistor R306.

Voltage-controlled oscillator module U307 is varactor tuned. Therefore, as the voltage being applied to pins 1 and 7 of the VCO varies (2-11V), so does the varactor's capacitance which changes the VCO output frequency. The 800 MHz VCO is a dual-range oscillator that covers the 806-825 MHz and the 851-870 MHz frequency bands.

The low-band VCO (777-825 MHz) provides the first LO injection frequencies (777-797 MHz) that are 73.35 MHz below the carrier frequency. In addition, in the transmit mode when the radio is operated through a repeater, the low-band VCO generates the transmit

## 800 MHz RF BOARD (VERSION A/B)

frequencies (806-825 MHz) that are 45 MHz below the receiver frequencies. The low band VCO is selected by pulling pin 3 high and pin 8 low on U307. When radio-to-radio or talk-around operation is necessary, the high band VCO (851-870 MHz) is selected. This is accomplished by pulling pin 3 low and pin 8 high on U307.

The buffer IC (U303) includes a Tx, Rx, and prescaler buffer which maintain a constant output level and provides isolation. The Tx buffer is selected by setting pin 7 of U303 high, and the Rx buffer is selected by setting pin 7 of U303 low. The prescaler buffer is always on. In order to select the proper combination of VCO and buffer, the following conditions must be true at pin 6 of U303 (or pin 38 of U302) and pin 7 of U303 (or pin 39 of U302):

- For first LO injection frequencies 777-797 MHz, pins 6 and 7 must both be low.
- For Tx repeater frequencies 806-825 MHz, pins 6 and 7 must both be high.
- For talk-around Tx frequencies 851-870 MHz, pin 6 must be low and pin 7 must be high.

The synthesizer IC (U302) consists of a prescaler, a programmable loop divider, a divider control logic, a phase detector, a charge pump, an A/D converter for low-frequency digital modulation, a balance attenuator to balance the high-frequency analog modulation to the low-frequency digital modulation, a 13V positive-voltage multiplier, a serial interface for control, and finally, a filter for the regulated 5-volt supply. This filtered five volts is present at pin 19 of U302, pin 9 of U307, and pins 2, 3, 4, and 15 of U303. It is also applied directly to resistors R309, R315, and R311. Additionally, the 13V supply generated by the positive voltage multiplier circuitry should be present at pin 35 of U302. The serial interface (SRL) is connected to the microprocessor via the data line (pin 2 of U302), clock line (pin 3 of U302), and chip-enable line (pin 4 of U302).

The complete synthesizer subsystem operates as follows:

- The output of the VCO, pin 4 on U307, is fed into the RF input port (pin 9) of U303. In the Tx mode,

the RF signal is present at pin 4 of U303; in the RX mode, the RF signal is present at pin 3 of U303.

- The output of the prescaler buffer, pin 15 of U303, is applied to the PREIN port (pin 21) of U302. The prescaler in U302 is a dual modulus type with selectable divider ratios. This divider ratio is controlled by the loop divider, which in turn receives its inputs from the SRL. The loop divider adds or subtracts phase to the prescaler divider by changing the divide ratio via the modulus control line.
- The output of the prescaler is then applied to the loop divider.
- The output of the loop divider is then applied to the phase detector. The phase detector compares the loop divider's output signal with the signal from U304 (that is divided down after it is applied to pin 14 of U302). The result of the signal comparison is a pulsed DC signal which is applied to the charge pump.
- The charge pump outputs a current that is present at pin 32 of U302. The loop filter (which consists of capacitors C322, C317, C318, C329, C324, and C315, and resistors R307, R305, and R314) transforms this current into a voltage that is applied to pins 1 and 7 of U307 to alter the VCO's output frequency.

In order to modulate the PLL, the two-port modulation method is utilized. The analog modulating signal is applied to the A/D converter as well as the balance attenuator, via U302, pin 5. The A/D converter converts the low-frequency analog modulating signal into a digital code that is applied to the loop divider, thereby causing the carrier to deviate. The balance attenuator is used to adjust the VCO's deviation sensitivity to high-frequency modulating signals.

### 5.5.2 ANTENNA SWITCH

An electronic PIN diode switch steers RF between the receiver and transmitter. The common node of the switch is at capacitor C101. In the transmit mode, RF is routed to the anode of diode CR104. In receive mode, RF is routed to pin 1 of U201. In the transmit mode, bias current sourced from U504, pin

## 800 MHz RF BOARD (VERSION A/B)

21, is routed through PIN diodes CR104 and CR102 which biases them to a low-impedance state. Bias current returns to ground through U504, pin 20. In receive, U504, pin 21, is pulled down to ground and pin 20 is pulled up to B+ which reverse-biases diodes CR104 and CR102 to a high impedance.

### 5.5.3 RECEIVER FRONT END

The 800 MHz receiver front end converts the received RF signal to the first IF frequency of 73.35 MHz and also provides spurious immunity and adjacent channel selectivity. The received RF signal is passed through antenna switch input matching components C101, L105, and C114, through tank components C106 and L103 (which are anti-resonant at the radios transmitter frequencies), and through output matching components C103 and L104. Both pin diodes CR102 and CR104 must be back-biased to properly route the received signal.

The stage following the antenna switch is a 50-ohm, inter-digitated, three-pole, stripline preselector (U201). The preselector is positioned after the antenna switch to provide the receiver preamp with some protection against strong, out-of-band signals.

After the preselector (U201), the received signal is processed through receiver preamp U202. The preamp is a dual-gate, GaAs MESFET transistor which has been internally biased for optimum IM, NF, and gain performance. Components L201 and L202 match the input (gate 1) of the amp to the first preselector, while at the same time connecting gate 1 to ground potential. The output (drain) of the amp is pin 7, and is matched to the subsequent receiver stage by L204 and C222.

A supply voltage of 5V DC is provided to pin 3 through RF choke L203 and bypass capacitor C204. The 5-volt supply is also present at pin 4, which connects to a voltage divider network that biases gate 2 (pin 5) to a predefined quiescent voltage of 1.2V DC. Resistor R202 and capacitor C203 are connected to pin 5 to provide amp stability. The FET source (pin 3) is internally biased at 0.55 to 0.7VDC for proper operation with bypass capacitors C201 and C202, connected to the same node.

The output of the amp is matched to a second three-pole preselector (U203) of the type previously

discussed. The next stage in the receiver chain is first mixer U205 which uses low-side injection to convert the RF carrier to an intermediate frequency (IF) of 73.35 MHz.

Since low-side injection is used, the LO frequency is offset below the RF carrier by 73.35 MHz, or  $f_{LO} = f_{RF} - 73.35 \text{ MHz}$ . The mixer utilizes GaAs FETs in a double-balanced, Gilbert Cell configuration. The LO port (pin 8) incorporates an internal buffer and a phase shift network to eliminate the need for a LO transformer. The LO buffer bypass capacitors (C208, C221, and C216) are connected to pin 10 of U205, and should exhibit a nominal DC voltage of 1.2 to 1.4V DC. Pin 11 of U205 is LO buffer Vdd (5V DC), with associated bypass capacitors C226 and C209 connected to the same node. An internal voltage divider network within the LO buffer is bypassed to virtual ground at pin 12 of U205 through bypass capacitor C213. The mixer's LO port is matched to the radio's PLL by a capacitive tap, C207 and C206.

A balun transformer (T202) is used to couple the RF signal into the mixer. The primary winding of T202 is matched to the preceding stage by capacitor C223, with C227 providing a DC block to ground. The secondary winding of T202 provides a differential output, with a 180° phase differential being achieved by setting the secondary center tap to virtual ground using bypass capacitors C210, C211, and C212. The secondary of transformer T202 is connected to pins 1 and 15 of the mixer IC, which drives the source leg of dual FETs used to toggle the paralleled differential amplifier configuration within the Gilbert Cell.

The final stage in the receiver front end is a two-pole crystal filter (FL1). The crystal filter provides some of the receiver's adjacent channel selectivity. The input to the crystal filter is matched to the first mixer using L605, C600, and C614. The output of the crystal filter is matched to the input of IF buffer amplifier transistor Q601 by L600, C609, and C610.

### 5.5.4 RECEIVER BACK END

The IF frequency on the collector of Q601 is applied to a second crystal filter (FL2) through a matching circuit consisting of L601, L602, C604, and C612. The filter supplies further attenuation at the IF sidebands to increase the radio's selectivity. The output of FL2 is routed to pin 32 of U401 through a matching

## 800 MHz RF BOARD (VERSION A/B)

circuit consisting of L603, C603, and C606, and DC blocking capacitor C613.

In the ABACUS IC (U401), the first IF frequency is amplified and then down-converted to the second IF of 450 kHz. The analog signal is then converted into two digital bit streams by a sigma-delta A/D converter. The bit streams are then digitally filtered, mixed down to baseband, and filtered again. The differential output data stream is then sent to the ADSIC on the logic board, where it is decoded to produce the recovered audio.

The ABACUS IC (U401) is electronically programmable. The amount of filtering is dependent on the radio channel spacing and signal type, and is controlled by the microcomputer. Additional filtering, which used to be provided externally by a conventional ceramic filter, is replaced by internal digital filters in the ABACUS IC. The ABACUS IC contains a feedback AGC circuit to expand the dynamic range of the sigma-delta converter. The differential output data contains the quadrature (I and Q) information in 16-bit words, the AGC information in a 9-bit word, imbedded word sync information, and fill bits which are dependent on sampling speed. A fractional N synthesizer is also incorporated on the ABACUS IC for 2nd LO generation.

The second LO/VCO is a Colpitts oscillator built around transistor Q1. The VCO has a varactor diode (VR401), which is used to adjust the VCO frequency. The control signal for the varactor is derived from a loop filter consisting of C426, C428, and R413.

### 5.5.5 TRANSMITTER

The 800 MHz RF power amplifier (PA) is a five-stage amplifier (U502). The RF power amplifier has a nominal input and output impedance of 50 ohms.

An RF input drive level of approximately +3 dBm, supplied from the VCO buffer IC (U303), is applied to pin 1 of U502. The DC bias for the internal stages of U502 is applied to pins 3 and 4 of the module. Pin 3 is switched through Q502 and pin 4 is unswitched B+ to the final amplifier stage. Power control is achieved by varying of the DC bias to pin 2, the third and fourth amplifier stages of the module. The amplified RF signal leaves the PA module at pin 5 and is applied to the directional coupler (U501).

\* A reverse biased pin diode presents a high impedance to RF signals. Conversely, and a forward biased pin diode presents a variable low impedance that changes inversely to current.

## VHF 50W PA BOARD

The purpose of U501 is to sample both the forward power and the reverse power. Reverse power is present when a load other than 50 ohms exists at the antenna port. The sampling is achieved by coupling some of the reflected power, forward and/or reverse, to a coupled leg on the coupler. The sampled RF signals are applied to diode CR501 for rectification and summing. The resultant DC signal is applied to the ALC IC (U504, pin 2) as RFDET, to be used as an indicator of the strength of the RF signal being passed through the directional coupler (U501).

The transmit ALC IC (U504) is the main part of the power control loop. The REF V line (U504 pin 7), a DC signal supplied from the D/A IC (U503), and the RF DET signal described earlier, are compared internally in the ALC IC to determine the amount of C BIAS, pin 4, to be applied to the base of transistor Q501. Transistor Q501 responds to the base drive level by varying the DC control voltages applied to pin 2 of the RF PA which controls the RIF power level of module U502. The ALC IC also controls the base switching to transistor Q502 via pin 12, BIAS.

The D/A IC (U503) controls the DC switching of the transceiver board. Its outputs, SC1 and SC3 (pins 12 and 14, respectively), control transistor Q503 which then supplies Tx 5V and Rx 5V to the transceiver board. The D/A also supplies DC bias to the detector diode (CR501) via pin 7, and the REF V signal to the ALC IC (U504).

## 5.6 VHF 50W PA BOARD

### 5.6.1 ANTENNA SWITCHES

The RF signal from the RF board is fed by a coaxial cable to the PA board. Since both the receive and transmit signals are present on the input of the PA board, special antenna switching is required on the PA board to route the receive signal around the amplifier section to the antenna. Both a high power and a low power antenna switch are used as shown in Figure 5-3.

The low power switch consists of pin diodes\* CR512 and CR513 and other components. The Q7 output of shift register U501 is high in the transmit mode and low in the receive mode. Therefore, in the transmit mode, Q507 and Q514 are on and Q508 and Q513 are off. This forward biases CR513 and reverse biases CR512. The transmit signal from the RF board

## VHF 50W PA BOARD (CONT'D)

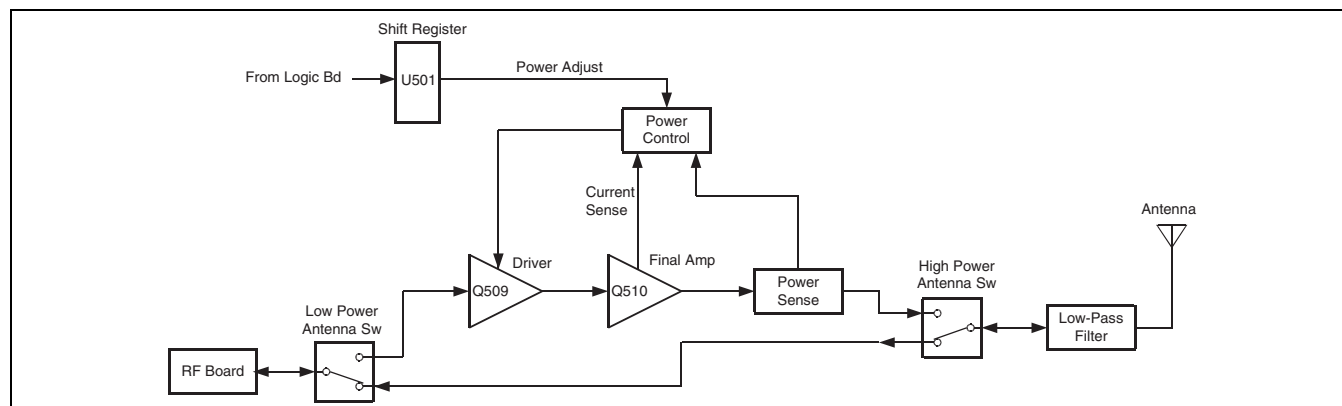


Figure 5-3 VHF 50W PA Board Block Diagram

then has a low impedance path through C533 and CR513 to driver Q509, and the high impedance provided by CR512 blocks it from the receive path.

In the receive mode, the opposite occurs, so CR513 is reverse biased and CR512 forward biased. The receive signal from the high power antenna switch (see following) then has a low impedance path through C544, CR512, and C534 to the RF board, and is blocked from the power amplifier by CR513.

The high power antenna switch consists of pin diodes\* CR501, CR502, and CR503. This switch effectively switches the antenna between the power amplifier and the receive bypass path to the RF board (see preceding illustration).

Transistor Q501 is on in the transmit mode and off in the receive mode. Therefore, in the transmit mode, all three diodes are forward biased (CR501 and CR502 are biased by voltage applied from the collector of Q510). The transmit signal then has a low impedance path through CR502 to the low-pass filter and is blocked from the bypass path by L504/C511 and L505/C515 which present a high impedance at the transmit frequency. In the receive mode, all three diodes are reverse biased. Therefore, the receive signal from the antenna is blocked from the power amplifier by CR502 and has a low impedance path through L504 and L505 to the RF board.

### 5.6.2 AMPLIFIERS (Q509, Q510)

Impedance matching between the low power antenna switch and Q509 is provided by L511 and several capacitors and sections of microstrip. Class C

biasing is provided by L510 and ferrite bead EP503, and negative feedback for stabilization is provided by R557 and R543. Supply voltage to Q509 is controlled by the power control circuit to regulate the power output of the transmitter. Conditioning and isolation of the DC supply to Q509 is provided by L509, L514, EP501, and C540-C542.

Impedance matching between Q509 and final amplifier Q510 is provided by several capacitors and sections of microstrip. Class C biasing of Q510 is provided by L515, EP502, R559, and R560. The current for this stage flows through L516, R561, and L517. The voltage drop across R561 is sensed by the power control circuit to detect an over-current condition.

From Q510 the transmit signal is fed through another impedance matching network to a directional coupler, to the high power antenna switch (see preceding section), and then to the low-pass filter. This filter attenuates harmonics occurring above the transmit frequency band to prevent adjacent channel interference. The directional coupler detects the forward component of the output power for use by the power control circuit.

### 5.6.3 POWER CONTROL

#### Introduction

The power control circuit maintains a constant power output as changes occur in temperature and voltage. It does this by sensing forward power and then varying the drive to Q510 to maintain a constant output power. The drive to Q510 is controlled by

\* A reverse biased pin diode presents a high impedance to RF signals. Conversely, and a forward biased pin diode presents a variable low impedance that changes inversely to current.



**VHF 50W PA BOARD (CONT'D)**

varying the supply voltage to driver Q509. The current to final amplifier Q510 is also sensed, but power output is affected by this input only if current becomes excessive. Power output is then cut back to approximately 25% of full power.

The power output level is set in 127 steps by D/A converter U501 which is controlled by the microcontroller. This allows power to be adjusted using the PCTune software and computer and also different power levels to be programmed. In addition, it allows the microcontroller to cut back power if the power amplifier temperature is excessive. Temperature is sensed via thermistor RT501.

**U502A, Q500/Q502 Operation**

The forward power signal from the directional coupler is applied to pin 2 of amplifier U502A. This is a DC signal that increases proportionally to forward power. The other input to U502A is a DC reference voltage from a D/A converter formed by shift register U501 and several resistors. The voltage from this D/A converter sets the voltage on pin 3 which sets the power output of the transmitter.

U502A is a difference amplifier which amplifies the difference between the reference voltage on pin 3 and the forward power signal on pin 2. The turn-on time of U502A is controlled by the time constant of C528 and R534, and negative AC feedback to prevent oscillation is also provided by C528. This circuit operates as follows: Assume the output power attempts to increase. The DC voltage applied to U502A, pin 2 then increases which causes the output voltage on pin 1 to decrease. Transistors Q505 and Q506 then turn off slightly which decreases the supply voltage to driver Q509. The output power then decreases to maintain a constant power output. R541 and R542 limit the voltage gain of Q505 and Q506 to approximately two.

**Delayed PTT**

Transistor Q504 is used to delay power output for a short time after the transmitter is keyed. This allows the synthesizer and exciter to stabilize so that the transmitter does not transmit off-frequency. The signal which controls Q504 is from microcontroller U9 on the logic board. In the receive mode this output is low, so Q504 is off. Pin 2 of U502A is then pulled high by

**VHF 100W PA BOARD**

the 7.2-volt supply applied through R537 and CR506. This causes the output on pin 1 of U502A to go low which shuts off power to Q509. Then when the transmitter is keyed, the Q504 control signal goes high after a short delay. Q504 then turns on and diode CR506 is reverse biased. Only the forward power signal is then applied to pin 2 of U502A.

**Over-Current Shutdown**

Current to final amplifier Q510 is monitored by sensing the voltage drop across R561. Pins 3 and 6 of U506 are connected across this resistor. As current increases, the output voltage on U506, pin 8 decreases. This causes the output voltage of voltage follower U507A to decrease. This signal is applied to Schmitt trigger U502B. When the voltage on pin 6 rises above the reference on pin 5, the output on pin 7 goes low. This lowers the power control voltage applied to U502A, pin 3 which lowers the power output to approximately 25% of full power.

**5.7 VHF 100W PA BOARD**

With 100-watt models, an additional 100-watt PA board is mounted in an extended heat sink assembly. The two power amplifier stages on this board are effectively connected into the 50-watt PA board circuitry between final amplifier Q510 and the power detector circuit. Therefore, the power detector and low-pass on the 50-watt PA board continue to be utilized with 100-watt models.

Jumpers R511 and R512 are removed on the 50-watt PA board and the RF signal is coupled by C660 to the 100-watt PA board. A 90° hybrid coupler (U1) on the 100-watt board splits the signal into two approximately 25-watt signals that are fed to final amplifiers Q1 and Q2. R5 dissipates power reflected back into the device. A section of microstrip and several other components on the input of these devices provide impedance matching. Likewise, impedance matching on the output is provided by a section of microstrip and several other components.

In the Q1 collector circuit, L4, L5, ferrite bead EP2, and several capacitors provide biasing and also decoupling of various unwanted RF signals from the DC supply. Similar components in the collector circuit of Q2 provide a similar function. The signal from Q1

## UHF 15W PA BOARD

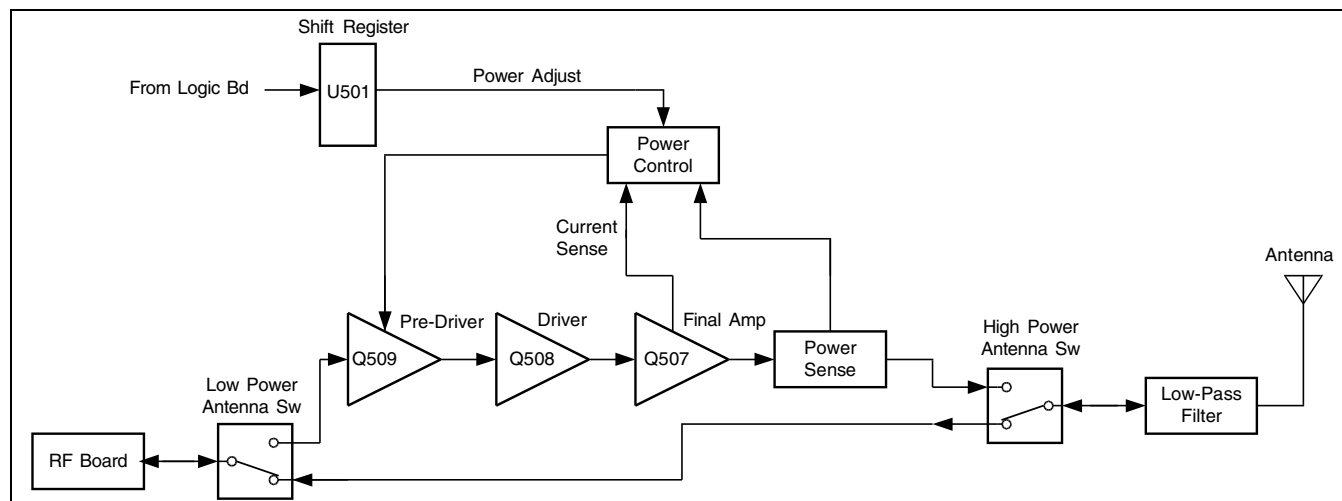


Figure 5-4 UHF 15W PA Board Block Diagram

and Q2 is combined by another hybrid coupler (U2) resulting in a 100W+ output signal. This signal is fed back to the 50-watt PA board and applied to the input of the power detect and antenna switch circuit.

## 5.8 UHF 15W PA BOARD

### 5.8.1 ANTENNA SWITCHES

The RF signal from the RF board is fed by a coaxial cable to the PA board. Since both the receive and transmit signals are present on the input of the PA board, special antenna switching is required on the PA board to route the receive signal around the amplifier section to the antenna. Both a high power and a low power antenna switch are used as shown in Figure 5-4.

The low power switch consists of pin diodes\* CR507 and CR508 and other components. The Q7 output of shift register U501 is high in the transmit mode and low in the receive mode. Therefore, in the transmit mode, Q504 and Q510 are on and Q505 and Q506 are off. This forward biases CR508 and reverse biases CR507. The transmit signal from the RF board then has a low impedance path through C574 and CR508 to driver Q509, and the high impedance provided by CR507 blocks it from the receive path.

In the receive mode, the opposite occurs, so CR508 is reverse biased and CR507 is forward biased. The receive signal from the high power antenna switch (see following) then has a low impedance path through

C519, C555, CR507, and C569 to the RF board, and is blocked from the power amplifier by CR508.

The high power antenna switch consists of pin diodes\* CR501, CR505, and CR503. This switch effectively switches the antenna between the power amplifier and the receive bypass path to the RF board (see preceding illustration).

Transistor Q503 is on in the transmit mode and off in the receive mode. Therefore, in the transmit mode, all three diodes are forward biased (CR501 and CR505 are biased by voltage applied from the collector of Q507). The transmit signal then has a low impedance path through CR505 to the low-pass filter and is blocked from the bypass path by L501/C528 and L500/C523 which present a high impedance at the transmit frequency. In the receive mode, all three diodes are reverse biased. Therefore, the receive signal from the antenna is blocked from the power amplifier by CR505 and has a low impedance path through L501 and L500 to the RF board.

### 5.8.2 AMPLIFIERS (Q509, Q508)

Impedance matching between the low power antenna switch and Q509 is provided by 3 dB pad R568/R562/R569 and several capacitors and two sections of microstrip. Class C biasing is provided by L510, ferrite bead EP6, and R556. Supply voltage to Q509 is controlled by the power control circuit to regulate the power output of the transmitter. Condi-

\* A reverse biased pin diode presents a high impedance to RF signals. Conversely, and a forward biased pin diode presents a variable low impedance that changes inversely to current.

## UHF 15W PA BOARD (Cont'd)

tioning and isolation of the DC supply to Q509 is provided by L508, L510, EP1, and several capacitors.

Impedance matching between Q509 and driver Q508 is provided by two sections of microstrip and several capacitors. Class C biasing of Q508 is provided by L513, EP4, and R563. The supply voltage to this stage is the unswitched battery supply.

Impedance matching and biasing on the input of final amplifier Q507 is similar to Q508. The current for this stage flows through L511, R554, and L505. The voltage drop across R554 is sensed by the power control circuit to detect an over-current condition.

From Q507 the transmit signal is fed through another impedance matching network to a directional coupler, to the high power antenna switch (see preceding section), and then to the low-pass filter. This filter attenuates harmonics occurring above the transmit frequency band to prevent adjacent channel interference. The directional coupler detects the forward component of the output power for use by the power control circuit.

### 5.8.3 POWER CONTROL

#### Introduction

The power control circuit maintains a constant power output as changes occur in temperature and voltage. It does this by sensing forward power and then varying the drive to Q508 to maintain a constant output power. The drive to Q508 is controlled by varying the supply voltage to pre-driver Q509. The current to final amplifier Q507 is also sensed, but power output is affected by this input only if current becomes excessive. Power output is then cut back to approximately 25% of full power.

The power output level is set in 127 steps by D/A converter U501 which is controlled by the microcontroller. This allows power to be adjusted using the PCTune software and computer and also different power levels to be programmed. In addition, it allows the microcontroller to cut back power if the power amplifier temperature is excessive. Temperature is sensed via thermistor R574.

#### U502A, Q500/Q502 Operation

The forward power signal from the directional coupler is applied to pin 2 of amplifier U502A. This is a DC signal that increases proportionally to forward power. The other input to U502A is a DC reference voltage from a D/A converter formed by shift register U501 and several resistors. The voltage from this D/A converter sets the voltage on pin 3 which sets the power output of the transmitter.

U502A is a difference amplifier which amplifies the difference between the reference voltage on pin 3 and the forward power signal on pin 2. The turn-on time of U502A is controlled by the time constant of C504 and R514, and negative AC feedback to prevent oscillation is also provided by C504. This circuit operates as follows: Assume the output power attempts to increase. The DC voltage applied to U502A, pin 2 then increases which causes the output voltage on pin 1 to decrease. Transistors Q501 and Q500 then turn off slightly which decreases the supply voltage to pre-driver Q509. The output power then decreases to maintain a constant power output. R516 and R521 limit the voltage gain of Q501 and Q500 to approximately two.

#### Delayed PTT

Transistor Q502 is used to delay power output for a short time after the transmitter is keyed. This allows the synthesizer and exciter to stabilize so that the transmitter does not transmit off-frequency. The signal which controls Q502 is from microcontroller U9 on the logic board. In the receive mode this output is low, so Q502 is off. Pin 2 of U502A is then pulled high by the 7.2-volt supply applied through R511 and CR500. This causes the output on pin 1 of U502A to go low which shuts off power to Q509. Then when the transmitter is keyed, the Q502 control signal goes high after a short delay. Q502 then turns on and diode CR500 is reverse biased. Only the forward power signal is then applied to pin 2 of U502A.

#### Over-Current Shutdown

Current to final amplifier Q507 is monitored by sensing the voltage drop across R554. Pins 3 and 6 of U505 are connected across this resistor. As current increases, the output voltage on U505, pin 8 decreases.

## UHF 40W PA BOARD

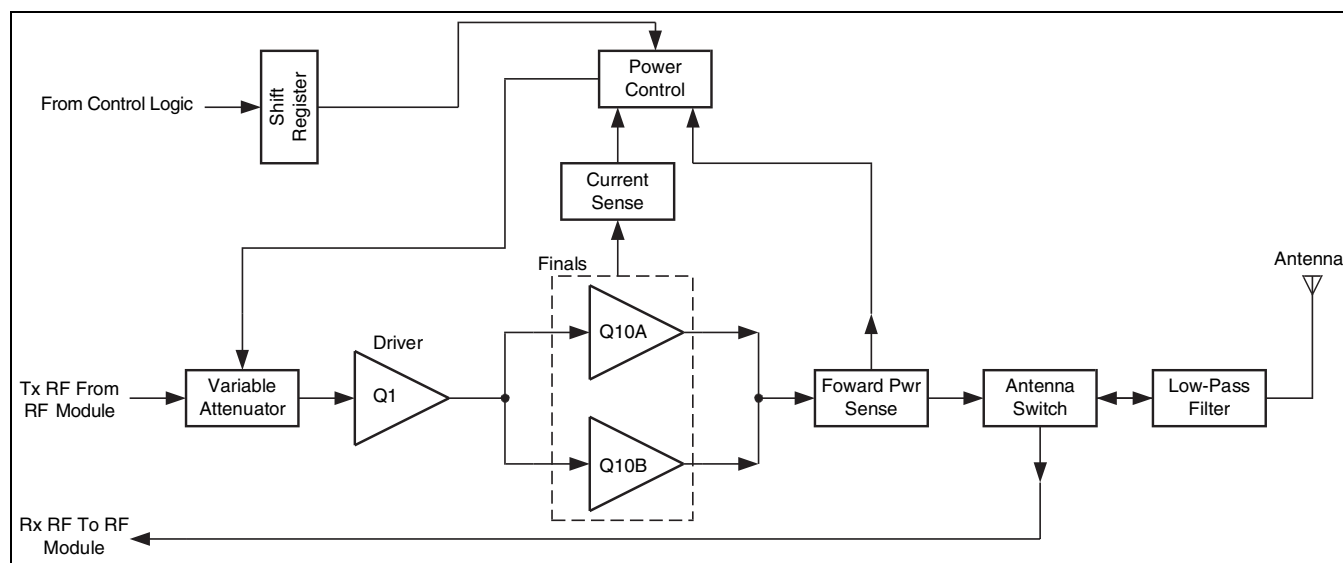


Figure 5-5 UHF 40W PA Board Block Diagram

This causes the output voltage of voltage follower U507A to decrease. This signal is applied to Schmitt trigger U502B. When the voltage on pin 6 rises above the reference on pin 5, the output on pin 7 goes low. This lowers the power control voltage applied to U502A, pin 3 which lowers the power output to approximately 25% of full power.

## 5.9 UHF 40W PA BOARD

*NOTE: A block diagram of the PA board is shown in Figure 5-5.*

### 5.9.1 VARIABLE ATTENUATOR

Two RF signals are connected to the RF module from the PA board. One is the transmit RF output signal and the other is the receive RF input signal. The transmit signal is applied to a variable attenuator on the PA board formed by CR101-CR104 and several other components. This circuit adjusts the input RF level to driver Q1 to control the power output of the PA board. CR101-CR104 are PIN diodes which have a very high impedance when they are reverse biased or in the off mode. As forward biasing current increases, the impedance decreases to a low level. Therefore, the RF level of the signal applied to driver Q1 increases as the bias current from the power control circuit increases.

### 5.9.2 DRIVER (Q1), FINALS (Q10)

Impedance matching for driver Q1 is provided by several capacitors and sections of microstrip. Q1 is an N-channel enhancement mode lateral MOSFET. The bias voltage (which is required for the device to turn on) is controlled by the transmit signal. It is applied to the gate and controlled by the logic through shift register U501. Therefore, this device is turned off in the receive mode which improves isolation. Several capacitors, inductors, and resistors isolate this supply from RF. Likewise, the 13-volt RAW BAT supply applied to the drain is isolated by similar components.

From driver Q1 the signal is fed to final amplifier Q10. Various capacitors, resistors, and sections of microstrip provide input and output impedance matching for Q10. That device includes two N-channel enhancement mode lateral MOSFETs operating in parallel and produces an output power of up to 70 watts. Gate bias is provided by the 8-volt transmit signal in a manner similar to driver Q1. A splitter circuit divides the signal on the RF signal into two inputs to this device. Then a combiner circuit on the output joins these signals together again. These splitters and combiners are formed by several capacitors, inductors, and sections of microstrip.

## UHF 40W PA BOARD (Cont'd)

### 5.9.3 FORWARD POWER DETECTOR, ANTENNA SWITCH, LOW-PASS FILTER

The power control circuit senses Q10 output power to control the power output. A directional coupler senses the forward power signal. This signal is then rectified by CR105 and applied to the power control circuit. This signal is a DC voltage that increases in proportion to the level of forward power. Refer to Section 5.9.4 for more information on power control.

PIN diodes CR106 and CR401-CR403 form an antenna switch that switches the antenna to the transmitter in the transmit mode and the receiver in the receive mode. As stated in Section 5.9.1, PIN diodes have a very high impedance when in the off mode and a very low impedance when forward biased. Transistors Q401 and Q403 are on in the transmit mode and off in the receive mode.

In the transmit mode all four diodes are forward biased. The transmit signal then has a low impedance path through CR106 to the low-pass filter and is blocked from the receiver by a grounded quarter-wave line formed by C402, L401, and C403. A grounded quarter-wave line presents a very high impedance at the non-grounded end. PIN diodes CR401 and CR403 and a second quarter-wave line formed by C409, C410, and L402 provide additional isolation.

In the receive mode, all four diodes are in the off mode. Therefore, the receive signal from the antenna is blocked from the power amplifier by CR106 and has a low impedance path through L401, C408, L402, and C401 to the receiver in the RF module.

From the antenna switch the RF signal is applied to a low-pass filter formed by L123-L125 and several capacitors and sections of microstrip. This filter attenuates harmonic frequencies above the transmit band that could cause adjacent channel interference. R300 dissipates static buildup in the antenna.

### 5.9.4 POWER CONTROL

#### Introduction

The power control circuit maintains a constant power output as changes occur in power amplifier

temperature and voltage. It does this by sensing forward power and then varying the drive to Q1 to maintain a constant output power. The drive to Q1 is controlled by varying the voltage applied to the variable attenuator circuit described in Section 5.9.1. In addition, the current applied to final amplifier Q10 is sensed, and if it becomes excessive, power is cut back to a low level.

The power output level is set in 127 steps by a D/A converter formed by shift register U501 and several resistors. This converter is controlled by the microcontroller to provide the following functions:

- It allows the RF power output level to be adjusted using the PCTune™ software.
- It allows the microcontroller to cut back power if the power amplifier temperature sensed by thermistor RT501 becomes excessive.
- It allows high and low power levels to be selected by the user or to be fixed by programming using the PCConfigure™ software.

#### Forward Power Sense

The forward power signal from the directional coupler is applied to pin 2 of amplifier U502A. This is a DC signal that increases proportionally to forward power. The other input to U502A on pin 3 is a DC reference voltage from the D/A converter. This signal sets the power output of the transmitter.

U502A is a difference amplifier which amplifies the difference between the reference voltage on pin 3 and the forward power signal on pin 2. The turn-on time of U502A is controlled by the time constant of C517 and R519, and negative AC feedback to prevent oscillation is also provided by C517.

This circuit operates as follows: Assume the output power attempts to increase. The DC voltage applied to U502A, pin 2 then increases which causes the output voltage on pin 1 to decrease. Transistors Q501 and Q502 then turn off slightly which decreases the supply voltage to the variable attenuator circuit. The Q1 input power then decreases as does the drive to Q10. The Q10 output power then decreases to maintain a constant power output. R523 and R24 limit the voltage gain of Q501 and Q502 to approximately two.

## UHF 40W PA BOARD (Cont'd)

### Delayed PTT

Transistor Q503 is used to delay power output for a short time after the transmitter is keyed. This allows the synthesizer and exciter to stabilize so that the transmitter does not transmit off frequency. The signal which controls Q503 is from microcontroller on the logic board. In the receive mode this output is low, so Q503 is off. Pin 2 of U502A is then pulled high by the 8-volt supply applied through R525 and CR503. This causes the output on pin 1 of U502A to go low which shuts off Q501 and Q502. Then when the transmitter is keyed, the Q503 control signal goes high after a short delay. Q503 then turns on and diode CR503 is reverse biased. Only the forward power signal is then applied to pin 2 of U502A.

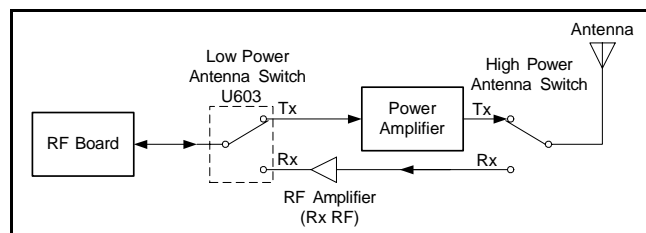
### Over-Current Shutdown

Current to final amplifier Q10 is monitored by sensing the voltage drop across R132. Pins 3 and 6 of U102 are connected across this resistor. As current increases, the output voltage on U102, pin 8 increases. This voltage is applied to Schmitt trigger U502B and when the voltage on pin 6 rises above the reference on pin 5, the output on pin 7 goes low. This lowers the power control voltage applied to U502A, pin 3 which lowers the power output to approximately 25% of full power.

## 5.10 800 MHz 35W PA BOARD

### 5.10.1 LOW POWER ANTENNA SWITCH

The RF signal from the RF board is fed by a coaxial cable to the PA board. Since both the receive and transmit signals are present on the input of the PA board, special antenna switching is required on the PA board to route the receive signal around the power amplifier section to the antenna. Both high power and a low power antenna switches are used as shown below.



Low power antenna switching is provided by electronic antenna switch U603. Pin 5 is effectively connected to pin 1 when pin 6 is high (and pin 4 is low). Conversely, pin 5 is connected to pin 3 when pin 4 is high and pin 6 is low. These control signals are provided by the Q7 output of shift register U501 and inverters Q516/Q517. In the transmit mode, the signal from the RF board is then routed through C532 to the PA module, and blocked from RF amplifier Q503. In the receive mode, the opposite occurs. Refer to Section 5.10.4 for a description of the high power antenna switch.

### 5.10.2 POWER DETECTOR AND ATTENUATOR

The transmit RF output signal of pin 3 of antenna switch U603 is coupled by C595 to a power detector circuit formed by CR521, R591, and other components. When RF power is detected, the voltage on pin 13 of op amp U502 increases. When it rises above the reference on pin 12, the output on pin 14 goes low and turns off Q507. The base of Q505 is then no longer grounded which allows it to be controlled by the power control circuit. This provides maximum attenuation in the receive mode to minimize the amplification of any low level receive signal that may be present (see following).

A 3-dB pad formed by R541, R542, and R543 provides attenuation of the RF signal and also a 50-ohm impedance. Matching between U603 and this pad is provided by C532 and L514. This pad is then matched by a section of microstrip and L503 to a limiter and variable 50-ohm attenuator formed by pin diodes\* C516-C518 and other components. This attenuator provides approximately 0-20 dB attenuation of the RF signal input to PA module. This controls the power output of the transceiver.

The limiter section formed by CR516, CR517, C535 and biasing resistors R580/R581 attenuates high level input signals that could cause improper operation of the attenuator. The attenuator circuit is formed by CR518 and CR519 and controlled by Q505 and the rest of the power control circuit (see Section 5.10.6). Biasing of these diodes is provided by CR520, R597, R584, R582, R586, and R538 connected to the emitter of Q505. When Q505 is turned off, CR518 is reverse biased by the voltage applied through R537. It then provides maximum attenuation of the RF signal.

## 800 MHz 35W PA BOARD (Cont'd)

A shunt path is provided around CR518 by R583, C537, and R585. Pin diode CR519 is at its maximum forward biased condition when Q505 is off, and connects R583 to AC ground through C538. This maintains a constant 50-ohm impedance. Then as Q505 turns on, CR518 becomes forward biased and provides less attenuation. Likewise, CR519 becomes less forward biased which increases the impedance of the path to ground. From the attenuator the signal is coupled by C542 to a 1 dB, 50-ohm pad formed by R544-R546 and then applied to PA module U504.

### 5.10.3 POWER AMPLIFIER MODULE (U504), FINAL (Q509)

Power amplifier module U504 provides approximately 19 dB of gain. Pins 2, 3, and 4 are the supply voltage inputs to three separate gain stages. The supply voltage on pin 2 (VS1) is switched by Q508 and limited to 12 volts by CR508 and R549. Switch Q508 is controlled by the same signal used to control the high power antenna switch (see Section 5.10.4).

The supply voltage applied to pins 3 and 4 (VS2/VS3) is the unswitched battery from the power jack. Therefore, power is applied to these pins even when transceiver power is turned off.

The output signal on U504, pin 5 is then applied to final amplifier Q509 which provides about 5 dB of gain. Current to this stage flows through R550, and transmitter current is monitored by sensing the voltage drop across this resistor (see Section 5.10.6). The output impedance on U504, pin 5 is 50 ohms, and it is matched to Q509 by a section of microstrip, C556, C557, and C558. Class C biasing of Q509 is provided by L507. The unswitched battery supply applied to Q509 is isolated from RF by ferrite bead EP503, inductor L508, and several capacitors. Impedance matching is provided on the output by C559, C561, C562, C566, and a section of microstrip.

### 5.10.4 HIGH POWER ANTENNA SWITCH

The high power antenna switch consists of pin diodes\* CR501, CR502, CR503, and other components. This switch effectively switches the antenna to the power amplifier in the transmit mode, and the receive RF amplifier path in the receive mode (see preceding illustration).

Transistors Q506 and Q501 controlled by the Q7 output of shift register U501 after it is double inverted by Q516 and Q517. This signal is high in the transmit mode and low in the receive mode. Therefore, Q506 and Q501 are on in the transmit mode which forward biases CR501, CR502, and CR503. One current path is through Q501, R503, R504, CR501, L508, CR502, and L508, and the other is through Q506, R559, CR503, and R560.

Since a forward biased pin diode has a low impedance, the RF signal passes through CR502 to the low-pass filter. The signal is blocked from the RF amplifier by two discrete grounded quarter-wave lines. One line is formed by L508/C507 and the other by L502/C514. Diode CR501 is effectively AC grounded by C507, and CR503 is AC grounded by C514. When one end of a quarter-wave line is grounded, the other end presents a high impedance to the quarter-wave frequency.

In the receive mode, all three diodes are reverse biased. Therefore, the receive signal from the antenna is blocked from the power amplifier by CR502 and has a low impedance path through the quarter-wave lines which are no longer grounded. Resistors R505 and R506 improve the isolation provided by CR501 and CR502 when they are reverse biased in the receive mode.

### 5.10.5 DIRECTIONAL COUPLER, LOW-PASS FILTER, TEMP SENSE

A directional coupler is formed by adjacent sections of microstrip near C566. The forward component of output power is rectified by CR509 and developed across R557 and then fed to the power control circuit. Reverse power is not detected in this transceiver.

From the directional coupler the transmit RF signal is coupled by C511 to a low-pass harmonic filter formed by C501-C505 and several sections of microstrip. This filter attenuates harmonic frequencies occurring above the transmit band. Resistor R501 dissipates static buildup on the antenna.

The ambient power amplifier temperature is sensed by thermistor RT501. The resistance of a thermistor decreases as temperature increases. The thermistor forms a voltage divider with R147 on the audio/

## 800 MHz 35W PA BOARD (Cont'd)

logic board, and the voltage across this divider is monitored by A/D converter U21. If the PA temperature increases above limits set in software, the power is first cut back. Then if it continues to rise, the transmitter is turned off.

### 5.10.6 POWER CONTROL

#### Introduction

The power control circuit maintains a constant power output as changes occur in temperature and voltage. It does this by sensing the forward power and then varying the output of Q505 to maintain a constant output power (see Section 5.10.2). Although current to final amplifier Q509 is also sensed, power output is affected by this input only if current becomes excessive. Power output is then cut back to approximately 25% of full power.

The power output level is set in 127 steps by D/A converter U501 which is controlled by the microcontroller. This allows power to be adjusted using the PCTune software and computer and also different power levels to be programmed. In addition, it allows the microcontroller to cut back power if the power amplifier temperature is excessive. Temperature is sensed via thermistor RT501 (see Section 5.10.5).

#### U502A Operation

The forward power signal from the directional coupler is applied to pin 2 of amplifier U502A. This is a DC signal that increases proportionally to forward power. The other input to U502A is a DC reference voltage from a D/A converter formed by shift register U501 and several resistors. The voltage from this D/A converter sets the voltage on pin 3 which sets the power output of the transmitter.

U502A is a difference amplifier which amplifies the difference between the reference voltage on pin 3 and the forward power signal on pin 2. The turn-on time of U502A is controlled by the time constant of C525 and R527. This circuit operates as follows: Assume the output power attempts to increase. The DC voltage applied to U502A, pin 2 then increases which causes the output voltage on pin 1 to decrease. Transistor Q505 then turns off slightly which increases

the attenuation provided by the attenuation circuit (see Section 5.10.2). The output power then decreases to maintain a constant power output.

#### Delayed PTT

Transistor Q504 is used to delay power output for a short time after the transmitter is keyed. This allows the synthesizer and exciter to stabilize so that the transmitter does not transmit off-frequency. The signal which controls Q504 is from pin 14 of microcontroller U9 on the logic board. In the receive mode this output is low, so Q504 is off. Pin 2 of U500A is then pulled high by the 7.2-volt supply applied through R530 and CR505. This causes the output on pin 1 of U502A to go low which shuts off Q505 and produces maximum attenuation. Then when the transmitter is keyed, the Q504 control signal goes high after a short delay. Q504 then turns on and diode CR505 is reverse biased. Only the forward power signal is then applied to pin 2 of U502A.

#### Over-Current Shutdown

Current to final amplifier Q509 is monitored by sensing the voltage drop across R550. Pins 3 and 6 of U505 are connected across this resistor. As current increases, the output voltage on U505, pin 8 decreases. This signal is applied to Schmitt trigger U502B. When the voltage on pin 6 rises above the reference on pin 5, the output on pin 7 goes low. This lowers the power control voltage applied to U505 which lowers the power output to approximately 25% of full power.

### 5.10.7 RF AMPLIFIER (Q503)

The receive signal from the antenna switch is applied to bandpass filter Z501. This is a three-pole filter with a center frequency of 860 MHz and a bandwidth of 18 MHz. This filter attenuates frequencies outside the receive band such as the first injection, image, and half IF frequencies.

The signal is then applied to RF amplifier Q503 which improves and stabilizes receiver sensitivity and also recovers filter losses. A section of microstrip and C515 provide impedance matching on the input. CR504 protects the base-emitter junction of Q503 from damage caused by high level input signals.



## DC POWER DISTRIBUTION

The bias current of Q503 is fixed at a constant level by Q502. The collector current of Q503 flows through R511, and the voltage drop across that resistor (and therefore the current) is set by R508 and R509. For example, if current through R2511 attempts to increase, the emitter voltage of Q502 decreases. Q502 then conducts less and turns Q503 off slightly to maintain a constant bias current. This provides a stable bias over changes in temperature. The output signal of Q503 is applied to a 3 dB, 50-ohm pad formed by R587-R589, and then coupled by C531 to antenna switch U603. From U603 it is applied to the RF board.

### 5.11 DC POWER DISTRIBUTION

#### 5.11.1 POWER ON OPERATION

When the On-Off/Volume knob is pressed to turn power on (this is a push on/push off switch), the following sequence of events occurs:

1. The power switch closes and grounds the emitter of Q8 on the logic board.
2. If ignition switch sense is used, the 13V signal from the ignition switch is applied to the base of Q8 and pin A7 of microcontroller U6 (or pin 48 of microcontroller U9 with the Rev 3 logic board). If ignition sense is not used, pull-up resistor R145 can be installed to make the transceiver functional.
3. Q8 then turns on which grounds the base of Q512 on the PA board and turns it on. This turns on main power switching transistor Q511 and applies power to the switched portions of the transceiver.

#### 5.11.2 POWER OFF OPERATION

When power is turned off, the following sequence of events occur:

1. If the power switch is pressed, it opens and the base of Q8 is no longer grounded. This also applies a high signal to the microcontroller which then detects the power-off condition.
2. If ignition switch control of power is used, turning the ignition switch off causes the signal applied to the base of Q8 to go low. This signal is also inverted by Q5 and applied the microcontroller.

3. Q8 then turns off. However, when the controller detects the power-down request, it holds Q2 on to delay power turn-off until all the required save operations are complete.
4. The controller then turns off Q2 and both Q511 and Q512 on the PA board turn off which turns off transceiver power.

### 5.12 LOGIC BOARD (VERSION C)

*NOTE: The following describes the Version C logic board (see Section 1.12.2). Version B is similar except that the ADSIC has been replaced by the CODEC.*

#### 5.12.1 MICROCONTROLLER (U2)

Microcontroller U57 is PowerPC® based which gives this transceiver processing power equal to some current desktop computers. This microcontroller provides all transceiver control functions except signal processing which is provided by DSP U1.

Functions provided by U57 include detecting button presses, processing incoming and outgoing calls, displaying operational data to the user, and coordinating control of the other processor (DSP).

The operating speed of U2 is controlled by 4.9152 MHz crystal Y2. The internal clock is five times this frequency or 24.575 MHz (25 MHz operational).

#### 5.12.2 MEMORY

Memory devices include Flash, SRAM, EEPROM, and DSP SRAM. There is 8 megabyte of Flash that is used primarily for code storage but can also be used for as non-volatile memory.

The SRAM (static RAM) consists of four 256K x 16 devices (U20/U23/U71/U72). A 32K x 8 EEPROM (U58) is used to store personality data.

#### 5.12.3 DIGITAL SIGNAL PROCESSING OVERVIEW

The Digital Signal Processing (DSP) functions are performed by the DSP chip (U1) and the CODEC (U2) with the support of microcontroller U57. Func-

tions previously performed in hardware like filtering and limiting are performed by software running in the DSP chip.

The DSP section consists of a DSP chip (U1) and the CODEC (U2). The CODEC is a support chip for the DSP. It provides the interface between the DSP and the analog signal paths, and between the DSP and the Digital IF chip on the RF Board. Configuration of the Digital IF chip is handled primarily by microcontroller U57.

In receive mode, the DSP interfaces with the Digital IF chip IC on the RF Board. The DSP collects the I and Q samples from the Digital IF chip and performs channel filtering and frequency discrimination on the signals. The resulting demodulated signal is routed to the DSP via the serial port for further processing. After the DSP processing, the signal is sent to the CODEC D/A by writing to a memory-mapped register. The CODEC then converts the processed signal from the DSP to an analog signal and then outputs this signal on ASDSIC\_SDO to a single ended to differential converter (U61A/B). It is then

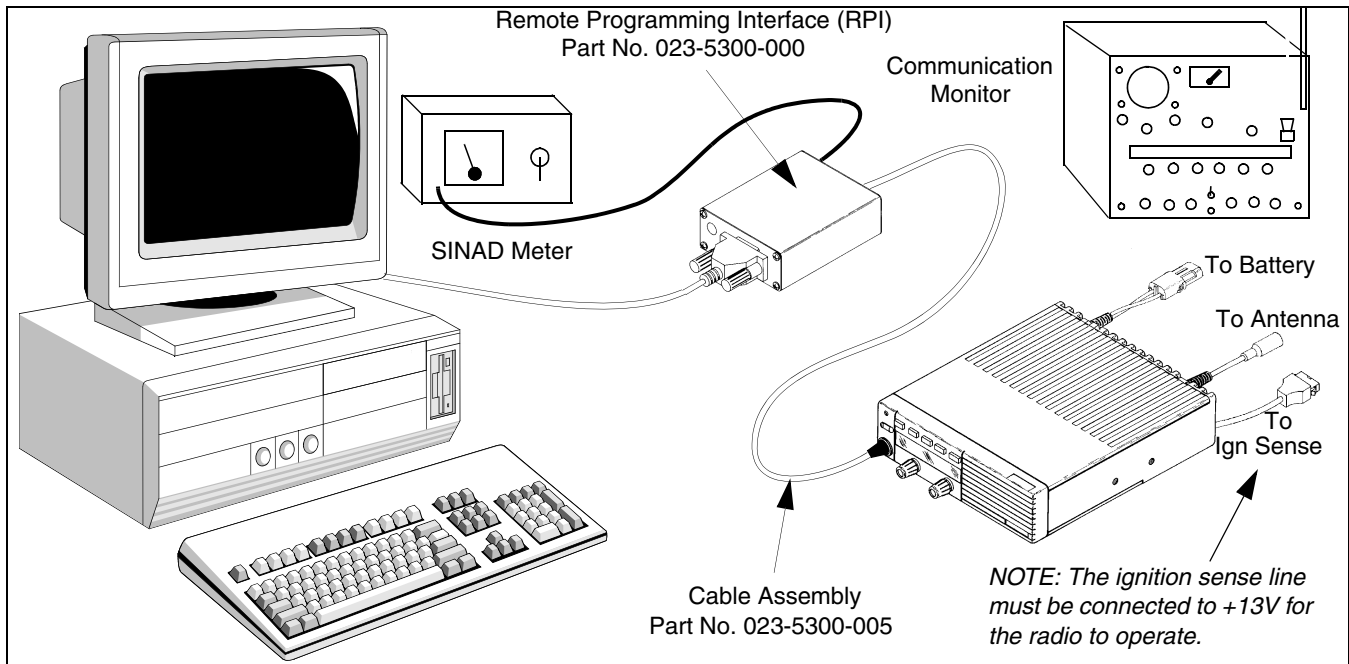
routed to the control unit, amplified, and then sent to the speaker.

In transmit mode the microphone signal is converted to a single ended signal, filtered, and then applied to the CODEC on CODEC\_IN and digitized by an internal A/D converter. The DSP reads these values from a memory-mapped register in the CODEC. After processing, the DSP sends the modulation signal to the CODEC via the serial port. In the CODEC, the VCO D/A converts the sampled modulation signal into an analog signal and then routes this signal to the VCO on the RF Board.

#### 5.12.4 RECEIVE SIGNAL PATH

The Digital IF chip on the RF Board provides a digital back end for the receiver section. It provides a digital output of I (in phase) and Q (quadrature) samples which represent the IF signal at the receiver back end. These samples are routed to the DSP where the signal is filtered and frequency discriminated to recover the modulating signal.

## SECTION 6 ALIGNMENT PROCEDURE



**Figure 6-1 Alignment Setup**

### 6.1 GENERAL

#### 6.1.1 INTRODUCTION

The following alignment procedure should be performed if repairs are made that could affect the factory alignment or if adjustments may have changed for some other reason. To verify radio operation, the performance tests in Sections 6.5 and 6.6 can be run.

To perform transceiver alignment, the following are required:

- PC-compatible computer
- Remote Programming Interface (RPI), Part No. 023-5300-000. Earlier RPIs, such as Part No. 023-9800-000 or 023-9750-000, cannot be used. Refer to Section 4.1.3 for more RPI information.
- PCTune software, Part No. 023-9998-499.

All adjustments are set digitally using the computer. Therefore, there is no need to disassemble the transceiver to access adjustment points. In addition, audio test signals are generated internally, so an audio generator is not required. The required test equipment is shown in Figure 6-1.

#### 6.1.2 TUNE SOFTWARE

##### General

The PCTune software is a Windows® program. Minimum software and hardware requirements are as follows:

- Windows® 95/98/NT/2000 (3.1 cannot be used)
- Pentium® processor or equivalent
- 16 MB of RAM
- A hard disk drive with at least 3 MB of free space
- A CD-ROM drive
- An available serial port

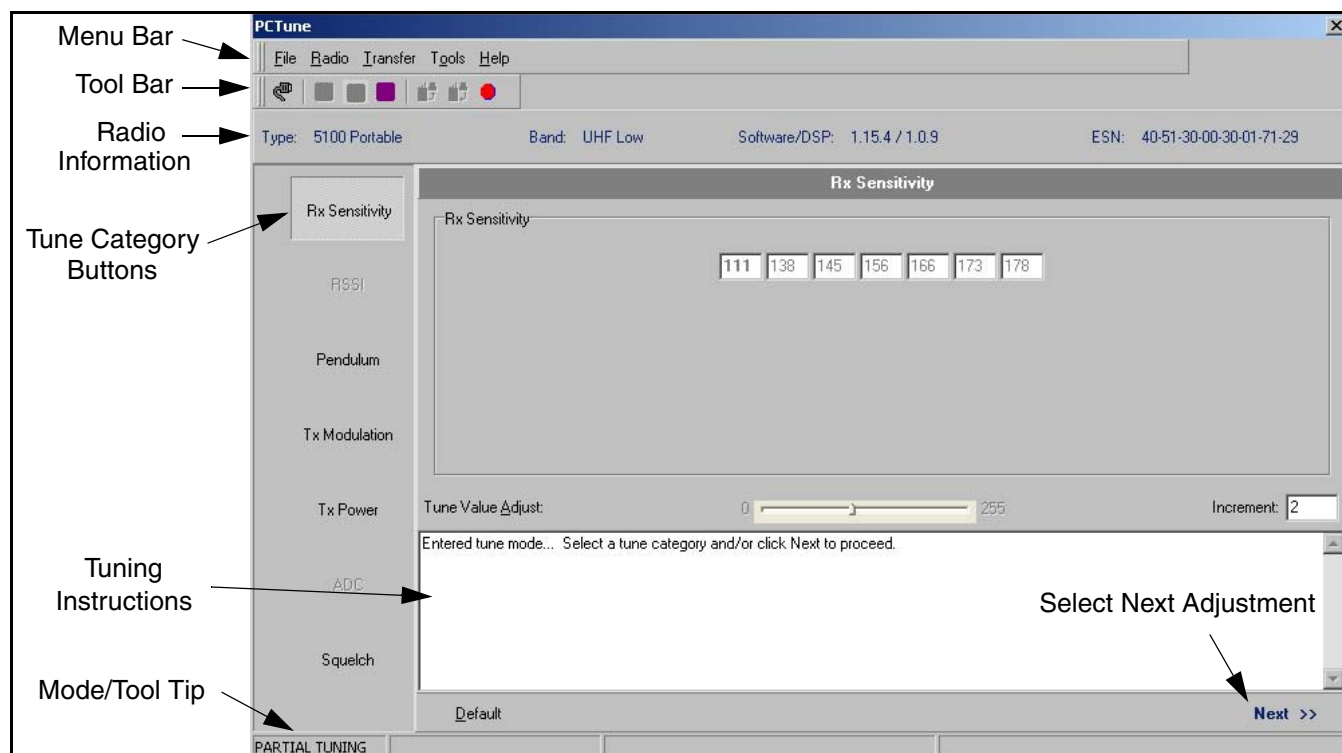


Figure 6-2 PCTune Main Screen

### Software Installation


Proceed as follows to install this software:

1. Close all applications that are currently running (other than Windows).
2. Insert the CD-ROM containing the PCTune software into the drive.
3. From the Windows taskbar, choose RUN and open SETUP.EXE on the drive being used. Alternatively, use File Explorer and double click SETUP.EXE.
4. Follow the instructions on the screen. The program is automatically loaded on the hard drive and start-up shortcuts or groups are created.

### Starting PCTune

Select Start in the taskbar, then Programs > PCTune > PCTune.

### Exiting PCTune

Select File > Exit or click the  button.

### On-Line Help

On-line help is currently not available.

### 6.1.3 PCTUNE VERSION REQUIRED


PCTune, Version 2.0.0 or later is required to tune the current RF board. The version number can be displayed by selecting the Help > About menu.






## 6.2 MAIN SCREEN

The main PCTune screen is shown in Figure 6-2. Information on the various parts of this screen follows:


**Menu Bar** - Used to select the menus described in Sections 6.3.1-6.3.5.

**Tool Bar** - These buttons are used to quickly select functions as follows:

 - Displays the screen used to set serial port parameters (see Section 6.3.3).

-  - Selects the Partial Tune mode the same as the Transfer > Tune Partial menu (see Section 6.3.3) This mode allows manual selection of the desired Tune Category and then automatically steps through the various settings for that adjustment.
-  - Selects the Edit Mode which allows parameters in the selected screen to be changed without stepping through each adjustment.
-  - Reads and displays the current parameters programmed in the radio the same as the Radio > Read Tune Parameters menu (see Section 6.3.3).
-  - Writes the current tune parameters to the radio the same as the Transfer > Write Tune Parameters menu (see Section 6.3.3). This occurs automatically when a Partial Tune adjustment is completed.
-  - Exits the current Tune Category without writing parameters to the radio.

## Radio Information

When tuning parameters are read from a radio by clicking the  button or selecting the Transfer > Read Parameters menu, the following information is displayed in the top part of the screen:

**Type** - The Radio Series selected by the Radio menu (see Section 6.3.2). The correct series must be selected for communication with the radio to occur.

**Band** - The radio frequency band of the radio displayed after information is read from radio. Do not select the band using Tools > Set Band (Section 6.3.4) because this may make the radio nonfunctional.

**Software DSP** - The first number is the version number of the radio firmware (Flash/operating code), and the second number is the version number of the DSP software.

**ESN** - The Electronic Serial Number electronically stored in the radio.

## Tuning Categories

These buttons select the tuning adjustment to be performed. Different functions are displayed for the 51xx and 53xx. If the Partial tune mode is selected, these buttons select the particular adjustment that is performed.

## Mode/Tool Tip

Information on the bottom line of the screen indicates the current tune mode and information on the selected button on other information.

## 6.3 MENU BAR DESCRIPTION

### 6.3.1 FILE MENU

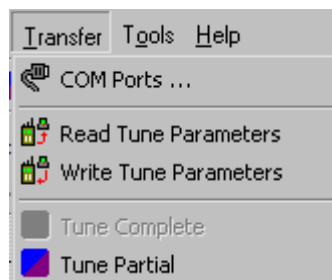
Selecting File > Exit closes the PCTune program.

### 6.3.2 RADIO MENU



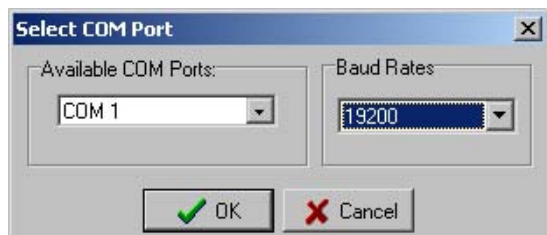
The Radio menu shown above selects the radio type. Select "5100" for the 51SL and Ascend portable, and select "5300" for the 53SL and Ascend mobile. The correct radio type must be selected for communication with the radio to occur.


### 6.3.3 TRANSFER MENU




**COM Ports** - Displays the following screen which selects the serial port (1-12) and baud rate (9600/19200) used for communication with the radio. Select the computer port to which the test cable is connected (see Section 6.4.1), and 19200 baud is normally

selected. These parameters default to the last selected condition the next time the program is started.




**Read Tune Parameters** - Selecting this function or clicking the  button reads the tune parameters currently programmed in the transceiver and displays them in the various screens.

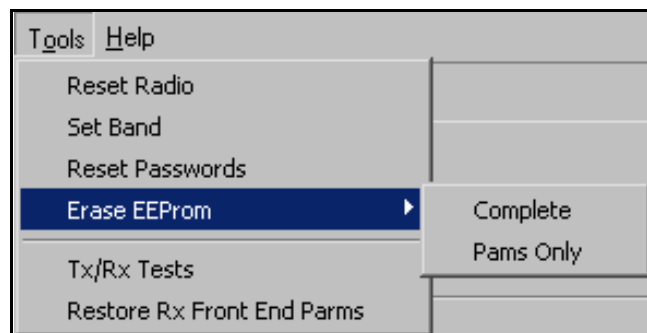
*NOTE: Values in the various screens are for reference only and adjustments should be done only by using the Partial Tune function.*

**Write Tune Parameters** - Selecting this function or clicking the  button writes the current tune parameters to the radio. This occurs automatically when a Partial Tune adjustment is completed.

**Tune Complete** - Currently not available. This function automatically steps through all the tests required to tune the radio.

**Tune Partial** - Selecting this function or clicking the  button selects the Partial Tune mode. This mode automatically steps through all the adjustments of the currently selected Tune Category.

#### 6.3.4 TOOLS MENU



**Reset Radio** - Resets the radio control logic similar to cycling power. This can be used, for example, to change the radio series or band or exit an adjustment before it is complete.

**Set Band** - Selects the operating band of the radio. All tuning values are reset to the factory defaults.

**CAUTION:** Do not select this function because it can make the radio non-functional.

**Reset Passwords** - Erases all password information contained in the radio. This function can be used, for example, to allow reprogramming of passwords if they are lost. *NOTE: Radio personality information is not erased by this function.*

#### Erase EEPROM

**CAUTION:** This function erases important radio programming information as described below.

**Complete** - Erases all EEPROM information, including factory programmed parameters.

**CAUTION:** Do not select this function because the radio must be returned to the factory to make it operational again.

**Parms Only** - Erases all personality information.

*NOTE: The radio must be reprogrammed after this function is selected.*

**Tx/Rx Tests** - Selects a screen which is used to check digital (P25) receive and transmit performance. Refer to Section 6.5 for more information.

**Restore Rx Front End Parameters** - Programs the radio with default receive front end tune parameters. Other parameters remain unchanged.

#### 6.3.5 HELP MENU

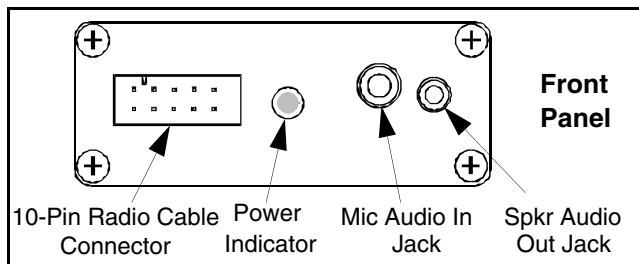
Displays the version number of the PCTune software and other information.

### 6.4 TUNING PROCEDURE

#### 6.4.1 CONNECTING TEST SETUP

1. With transceiver power turned off, connect the RPI to an unused serial port of the computer using a suitable cable (see Section 4.1.3).
2. Connect the RPI to the microphone jack of the transceiver using programming cable, Part No. 023-5300-005 (see Figure 6-1).

3. If the receiver squelch adjustment will be made, connect a SINAD meter to the Speaker Audio Out jack on the RPI (see Figure 6-3). This is a low level fixed audio output, and a 2.6 mm (3/32") phone jack is used.
4. Connect a wattmeter and a suitable load to the antenna jack of the transceiver for the transmitter tests. For the receiver tests, connect the signal generator to the antenna jack through a 6 dB or greater isolation pad.



**Figure 6-3 RPI Front Panel**

#### 6.4.2 STARTING AND CONFIGURING PCTUNE

1. Start the program as described in Section 6.1.2 and turn transceiver power on. Select Transfer > COM Port and make sure that the correct serial port and the 19200 baud rate are selected (see Section 6.3.3).
2. Select the Radio menu and make sure the correct radio series (53xx) is selected (see Section 6.3.2).
3. Select Transfer > Partial Tune and click the button for the desired Test Category.
4. Follow the instructions displayed on the screen to complete the various adjustments required for a particular setting. Then repeat for other applicable Test Categories. (The "Pendulum" test sets the TCXO frequency.)

### 6.5 DIGITAL PERFORMANCE TESTS

#### 6.5.1 GENERAL

This section describes how to check the performance of the radio on digital Project 25 channels. The PCTune software includes a Tools > Tx/Rx Tests menu that displays the screen used for these tests.

- To perform these tests, a Digital Communication Analyzer such as Motorola R2670 or IFR 2975 is required.
- These tests follow the TIA-102-CAAA-A "Digital C4FM/CQPSK Transceiver Measurement Methods" specification. Refer to that document for more information.
- A P25 conventional channel preprogrammed by the PCConfigure software is used for testing. The PCTune software does not select a specific test channel. The test channel must be programmed with the following options:

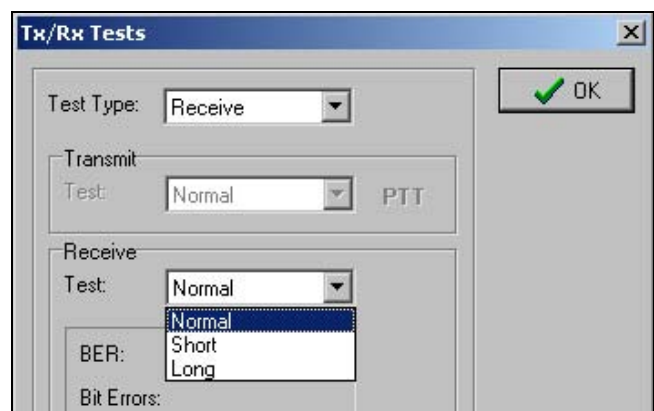
**NAC - 293 (hex)**

**TGID (Talk Group ID) - 1**

**Frequency - Any frequency in radio operating band**

#### 6.5.2 RECEIVE TEST SETUP

1. Connect the test setup and start and configure the PCTune software as described in Section 6.4. Select the Tools > Tx/Rx Tests menu to display the Tx/Rx Tests screen. Then in the Test Type drop-down list select Receive to display the following screen.



2. Connect the Digital Communication Monitor to the antenna jack using a 6 dB or greater isolation pad. Set the Monitor output for the "1011" test pattern.

#### 6.5.3 RECEIVE SENSITIVITY TEST

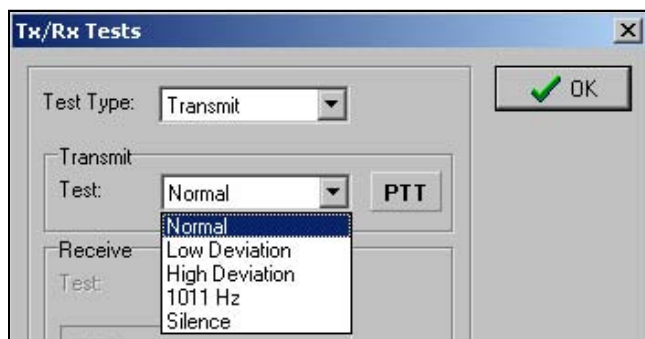
1. A tone should be heard from the radio speaker if the analyzer is set properly. Select the "Short" or

“Long” test in the Test drop down list and the radio should mute.

- Set the analyzer output level for  $0.35\ \mu\text{V}$  (–116 dBm) at the receiver antenna jack. The BER (Bit Error Rate) should be 5% or less. (This is a ratio of the receive bit errors to the total number of bits transmitted.)
- Increase the analyzer output level to  $1000\ \mu\text{V}$  (–47 dBm). The BER rate should be less than 0.01%. This is the BER Rate Floor.

#### 6.5.4 TRANSMITTER TESTS

- If applicable select the Tools > Tx/Rx Tests menu to display the Tx/Rx Tests screen. Then in the Test Type drop-down list select Transmit to display the following screen. Connect a dummy load to the radio antenna jack. Monitor the transmit signal with the Digital Communication Monitor.



- Select the **Low Deviation** test and set the analyzer as required to measure transmitter deviation. This test generates continuous repetitions of bits 10100000. Deviation should be 848-1037 Hz.
- Click the “PTT” button to transmit the tone. When finished, click that button again to turn the transmitter off.
- Select the “**High Deviation**” test which transmits a standard transmitter test pattern. Deviation should be 2544-3111 Hz.
- The “**1011 Hz**” test transmits a standard 1011 Hz tone similar to that used for the receiver test. This tone can be used to check the operation of other radios.

- The “**Silence**” test transmits a standard silence test pattern which produces no receive audio output by the receiving radio. This tone can also be used to test other radios.
- Select “**Normal**” to transmit a standard voice signal by speaking into the radio microphone.

### 6.6 ANALOG PERFORMANCE TESTS

#### 6.6.1 GENERAL

The PCTune software is not used for analog channel performance testing. Simply program the desired channels using the PCConfigure software as described in Section 4. The RPI is still required to monitor the audio output signal from the radio.

Depending on the application, 12.5 kHz, 25 kHz, and NPSPAC (800 MHz) test channels may need to be programmed. Also, test channels programmed with or without Call Guard® (CTCSS/DCS) squelch control may be required.

#### 6.6.2 RECEIVER PERFORMANCE TESTS

- Connect a signal generator to the antenna jack using a 6 dB or greater pad. Set the output for the channel frequency, modulated with 1 kHz at the following deviation:

**12.5 kHz Channels** - 1.5 kHz

**25 kHz Channels** - 3.0 kHz

**800 MHz NPSPAC Channels** - 2.4 kHz

- Connect a SINAD meter to the receive audio jack of the RPI (see Figure 6-3) This is a low level fixed audio output.

#### SINAD Sensitivity

- Set the signal generator output level for  $1000\ \mu\text{V}$  (–47 dBm) at the antenna jack.
- Decrease the signal generator output to obtain 12 dB SINAD. The signal generator output should be  $0.35\ \mu\text{V}$  (–116 dBm) or less for 25 kHz channels, or  $0.50\ \mu\text{V}$  (–113 dBm) or less for 12.5 kHz channels.



Audio Power Output and Distortion

5. Connect a distortion meter across the speaker load. Return the generator output to 1000  $\mu$ V. Distortion should be 3% or less.

Squelch Sensitivity

6. Increase the signal generator output from zero and note the SINAD when unsquelching occurs. It should be approximately 8 dB.

**6.6.3 TRANSMITTER PERFORMANCE TESTS**

1. Connect a wattmeter and dummy load to the antenna jack. Monitor the transmit signal with a communication monitor.

Transmit Frequency

2. Monitor the transmit frequency and at room temperature it should  $\pm 100$  Hz. At other temperatures ( $-30$  to  $+60^{\circ}$  C), it must be within 2.5 PPM (VHF/UHF) or 1.5 PPM (800 MHz). This also checks the receive frequency.

Transmit Power

3. Transmit power should be in the following ranges. High and low levels can be preset anywhere in this

range by PCTune. The factory default for high power is the maximum shown below, and low power is half that value.

**VHF Standard** - 10-50 watts

**VHF 100W** - 50-100 watts

**UHF 15W** - 7-15 watts

**UHF 40W** - 10-40 watts

**800 MHz** - 10-35 watts

Transmit Modulation

4. Monitor the transmit modulation with a modulation meter. Speak into the microphone with a normal voice. Modulation should be approximately as follows with no CTCSS/DCS signaling present:

**12.5 kHz Channels** - 1.4 kHz

**25 kHz Channels** - 3.4 kHz

**800 MHz NPSPAC Channels** - 2.5 kHz

5. Select a channel programmed with Call Guard (CTCSS/DCS) signaling. Maximum total Call Guard and voice modulation should be approximately as follows:

**12.5 kHz Channels** - 2.3 kHz

**25 kHz Channels** - 4.7 kHz

**800 MHz NPSPAC Channels** - 3.8 kHz

## SECTION 7 PARTS LIST

## Chassis, Hardware, Misc.

Ref No.	Description	Part No.
<b>CHASSIS, HARDWARE, AND MISCELLANEOUS</b>		
A 200	Interface board assembly Ver B (see separate listing which follows)	023-5300-211
	Interface board assembly Ver C (see separate listing which follows)	023-5500-200
A 300	Rx/exciter assembly (VHF, Ver B) (see separate listing on page 7-3)	023-5317-212
	Rx/exciter assembly (UHF, Ver B) (see listing on page 7-3)	023-5337-202
	Rx/exciter assembly (UHF, Ver C) (see listing on page 7-3)	023-5567-212
	Rx/exciter assy (800 MHz, Ver B) (see listing on page 7-3)	023-5387-212
A 301	Accessory pigtail cable (internal)	597-2002-230
	Acc pigtail cable w/EMI filter	023-5300-630
A 302	Remote/acc pigtail cable (internal)	597-2002-249
A 303	Remote pigtail cable (internal for second control unit)	597-2002-251
A 400	ARM logic board assembly, Ver A (see separate listing on page 7-19)	023-5300-421
	PPC logic board assembly, Ver B (see separate listing on page 7-25)	023-5300-6xx
	PPC logic board assembly, Ver C (see separate listing on page 7-31)	023-5500-600
A 500	VHF 50W PA bd assy 50W mod. (see separate listing on page 7-5)	023-5315-531
	VHF 50W PA bd assy 100W mod. (see separate listing on page 7-5)	023-5315-521
	UHF 15W PA board assembly (see separate listing on page 7-9)	023-5335-511
	UHF 40W PA bd assembly (see separate listing on page 7-12)	023-5365-501
	800 MHz 35W PA board assembly (see separate listing on page 7-15)	023-5385-501
A510	VHF 100W PA board assembly (see separate listing on page 7-8)	023-5315-510
A 810	Front panel assembly (frt mt) (see separate listing on page 7-38)	023-5300-810
CH 101	Chassis, std VHF/800 models	015-0970-001
	Chassis, std UHF models	015-0970-002
	Chassis, 100W VHF models	015-0970-011

Ref No.	Description	Part No.
EP 001	No. 6 terminal lug	586-0005-106
EP 002	Ferrite bead, .375 x .375	517-2002-003
EP 003	Ferrite block (for J200)	517-2002-020
EP 920	Snubber, bot shield for encryp mod	018-1134-136
HW 001	Captive screw, cover	537-9007-045
HW 002	Screw, 6-32 x 5/16 Torx	575-0006-010
HW 003	Plug, option (in unused chass hole)	032-0792-075
HW 004	Audio amp U1 clip	017-9700-001
HW 005	O-ring, 1/8 x 1/4 cover screw	574-2002-001
HW 006	Nylon washer, cover screw	596-4408-015
HW 007	Split rubber grommet 1/8ID	574-0002-015
HW 009	Flat washer, cover screw	596-9408-009
HW 010	Screw, 4-40 x 5/16 phil pan hd	575-0604-010
HW 011	Washer, No 4 split lock	596-1304-008
HW 012	Washer, No. 4 split lock	596-1304-008
HW 020	1/4 x 1.20 x 1.90 urethane pad	018-1007-250
HW 150	Screw, 4-40 x 5/16 phil pan hd	575-0604-010
HW 151	Screw, 6-32 x 3/8 phil flat hd	575-8206-012
HW 152	Screw, 8-32 x 3/8 hex socket hd	575-9076-012
HW 202	Screw, 4-40 x 1-1/8 mach pan hd	575-1604-036
HW 501	Screw, 4-40 x 3/16 flathead	575-1204-006
HW 502	Screw, 4-40 x 3/8 flathead	575-1204-012
J 002	RF – PA board connector	515-9006-110
J 200	Connector, 28-pin inline header	515-7181-038
MP 002	Cover, top black	015-0970-007C
MP 003	Cover, bottom black	015-0970-009C
MP 004	Gasket, blank front panel (remote)	032-0792-068
MP 005	Front panel, blank (remote)	032-0792-005
MP 151	Cover, 100W heatsink	017-9700-007
MP 152	Gasket, 100W heatsink cover	018-1136-142
MP 153	Gasket, 100W heatsink coax	018-1136-144
MP 156	Gasket, top cover	018-1136-136
MP 157	Gasket, bottom cover	018-1136-134
MP 300	Foam tape, dbl side	574-3002-013
MP501	Shield, coax gnd (800 MHz)	017-2226-017
MP 502	Shield, low-pass filter (800 MHz)	017-2226-036
MP 503	Grounding finger (800 MHz)	537-5001-010
MP 504	Grounding clip (800 MHz)	537-5001-004

## Interface Board Assembly

Ref No.	Description	Part No.
MP 505	Grounding clip (rx/ex assy)	017-9700-003
	Shield (800 MHz)	017-2227-063
	RF Shield (for Ver C radios)	017-2227-065
MP 506	Transistor ground tab (800 MHz)	017-2225-527
MP 601	Shield, low-pass filter wrap around	017-9700-010
MP 602	Cover, low-pass filter cover	017-9700-011
NP 001	Label, RS 5300	559-5300-100
NP 002	Label, EFJohnson	559-9001-310
W 103	Cable assy, display - logic bd	023-5300-025
W 110	Interface pigtail, motorcycle F DB25	597-2002-280
W 501	Pwr pigtail cable assembly, std PA	597-2002-235
	PA-PA pwr cable assy, 100W PA	597-2002-238
W 502	RF pigtail cable assembly, std PA	597-2002-240
	RF pigtail cable assy, 100W PA	597-2002-239
<b>INTERFACE BOARD (VER A/B)</b> Part No. 023-5300-211		
C 002	470 $\mu$ F 25V electrolytic	510-4064-471
C 003	100 $\mu$ F 25V electrolytic	510-4425-101
C 004	1.0 $\mu$ F 10V tantalum smd	510-2624-109
C 005	.1 $\mu$ F $\pm$ 5% X7R 50V cer smd	510-3609-104
C 006	.1 $\mu$ F $\pm$ 5% X7R 50V cer smd	510-3609-104
C 007	.1 $\mu$ F $\pm$ 5% X7R 50V cer smd	510-3609-104
C 009	470 pF $\pm$ 5% NPO cer smd	510-3602-471
C 010	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 011	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 012	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 013	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 014	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 015	.01 $\mu$ F $\pm$ 5% X7R 50V cer smd	510-3609-103
CR 001	10V zener SOT-23	523-2016-100
CR 002	Switching diode SOT-23	523-1504-002
J 201	Connector, 20-pin	515-7111-230
J 202	Connector, 30-pin	515-7106-430
P 100	Header, 2-pin friction lock	515-9031-201
P 101	Header, 3-pin friction lock	515-9031-202
P 102	Header, 3-pin friction lock	515-9031-202
PC 201	PC board, interface revision 2	035-5300-200 2
Q 001	NPN general purpose	576-0003-658
Q 002	NPN general purpose	576-0003-658

Ref No.	Description	Part No.
R 002	2.2 ohm $\pm$ 5% 1W smd	569-0175-229
R 003	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 004	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 005	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 006	7.5k ohm $\pm$ 5% 1/8W smd	569-0105-752
R 008	1k ohm $\pm$ 5% 1/8W smd	569-0115-102
R 009	1k ohm $\pm$ 5% 1/8W smd	569-0115-102
R 010	1k ohm $\pm$ 5% 1/8W smd	569-0115-102
R 011	10k ohm $\pm$ 1% 1/8W smd	569-0111-401
R 012	35.7k ohm $\pm$ 1% 1/8W smd	569-0111-454
R 013	10k ohm $\pm$ 5% 1/8W smd	569-0115-103
R 014	10k ohm $\pm$ 5% 1/8W smd	569-0115-103
R 015	Zero ohm jumper	569-0115-001
R 016	10k ohm $\pm$ 5% 1/8W smd	569-0115-103
R 017	3k ohm $\pm$ 5% 1/8W smd	569-0115-302
R 018	10k ohm $\pm$ 5% 1/8W smd	569-0115-103
R 019	Zero ohm jumper	569-0115-001
R 020	10k ohm $\pm$ 5% 1/8W smd	569-0115-103
R 021	10k ohm $\pm$ 5% 1/8W smd	569-0115-103
R 022	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
U 001	Audio amp, 22W TDA1519	544-2004-003
U 002	Voltage regulator, adjust TK11900	544-2603-093
U 003	Op amp, dual LM2904	544-2019-004
U 004	Dig potentiometer, 2-ch AD8402	544-0004-213
<b>INTERFACE BOARD (VER C)</b> Part No. 023-5500-200		
C 002	470 $\mu$ F 25V electrolytic	510-4064-471
C 003	100 $\mu$ F 25V electrolytic	510-4425-101
C 004	1.0 $\mu$ F 10V tantalum smd	510-2624-109
C 005	.1 $\mu$ F $\pm$ 5% X7R 50V cer smd	510-3609-104
C 006	.1 $\mu$ F $\pm$ 5% X7R 50V cer smd	510-3609-104
C 007	.1 $\mu$ F $\pm$ 5% X7R 50V cer smd	510-3609-104
C 009	470 pF $\pm$ 5% NPO cer smd	510-3602-471
C 010	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 011	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 012	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 013	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 014	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 015	.01 $\mu$ F $\pm$ 5% X7R 50V cer smd	510-3609-103
C 028	1 $\mu$ F $\pm$ 5% X7R 16V cer smd	510-3606-105
C 029	470 pF $\pm$ 10% 25V cer smd	510-3681-471

**Interface Board Assembly (Version C)**

Ref No.	Description	Part No.
CR 001	10V zener SOT-23	523-2016-100
CR 002	Switching diode SOT-23	523-1504-002
J 201	Connector, 20-pin	515-7111-230
J 202	Connector, 30-pin	515-7106-430
L 001	270 nH smd inductor	542-9017-274
L 002	270 nH smd inductor	542-9017-274
L 003	270 nH smd inductor	542-9017-274
P 100	Header, 2-pin friction lock	515-9031-201
P 101	Header, 3-pin friction lock	515-9031-202
P 102	Header, 3-pin friction lock	515-9031-202
PC 001	PC board, interface revision 2	035-5500-200 2
Q 001	NPN general purpose	576-0003-658
Q 002	NPN general purpose	576-0003-658
Q 003	NPN general purpose	576-0003-658
Q 004	NPN general purpose	576-0003-658
R 002	2.2 ohm $\pm 5\%$ 1W smd	569-0175-229
R 003	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 004	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 005	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 006	7.5k ohm $\pm 5\%$ 1/8W smd	569-0105-752
R 008	1k ohm $\pm 5\%$ 1/8W smd	569-0115-102
R 009	1k ohm $\pm 5\%$ 1/8W smd	569-0115-102
R 010	1k ohm $\pm 5\%$ 1/8W smd	569-0115-102
R 011	39k ohm $\pm 5\%$ 1/8W smd	569-0155-393
R 012	12k ohm $\pm 5\%$ 1/8W smd	569-0155-123
R 013	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 014	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 015	Zero ohm jumper	569-0115-001
R 016	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 017	3k ohm $\pm 5\%$ 1/8W smd	569-0115-302
R 018	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 019	Zero ohm jumper	569-0115-001
R 020	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 021	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 022	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 023	12k ohm $\pm 5\%$ 1/8W smd	569-0115-123
R 024	12k ohm $\pm 5\%$ 1/8W smd	569-0155-123
R 025	20k ohm $\pm 5\%$ 1/8W smd	569-0155-203
R 026	13k ohm $\pm 5\%$ 1/8W smd	569-0155-133
R 027	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103

**Receiver/Exciter Assembly**

Ref No.	Description	Part No.
R 028	100k ohm $\pm 5\%$ 1/8W smd	569-0115-104
R 029	100k ohm $\pm 5\%$ 1/8W smd	569-0115-104
R 030	100k ohm $\pm 5\%$ 1/8W smd	569-0115-104
R 031	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 032	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 033	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 034	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 035	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 036	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 037	39k ohm $\pm 5\%$ 1/8W smd	569-0155-393
R 038	470 ohm $\pm 5\%$ 1/8W smd	569-0155-471
R 039	10k ohm $\pm 5\%$ 1/8W smd	569-0155-103
R 040	470 ohm $\pm 5\%$ 1/8W smd	569-0155-471
R 041	10k ohm $\pm 5\%$ 1/8W smd	569-0155-103
U 001	Audio amp, 22W TDA1519	544-2004-003
U 002	Voltage regulator, adj REG103UA	544-2603-057
U 003	Op amp, dual LM2904	544-2019-004
U 004	Dig potentiometer, 2-ch AD8402	544-0004-213
U 006	Voltage regulator, adj REG103UA	544-2603-057
U 007	Multiplexer, triple 4053	544-1014-053
U 008	Voltage regulator, adj REG103UA	544-2603-057
U 009	CPLD prog logic device XC2C64	544-5001-420
U 010	Op amp, dual LM2904	544-2019-004

**RECEIVER/EXCITER ASSEMBLY  
(VERSION A/B)**

**Part No. 023-53x7-202/-212**

A 001	Interconnect board assy, unrevised (see separate listing which follows)	023-5300-050
	Interconnect board assy, revised (see separate listing which follows)	023-5300-055
A 002	RF board assembly, VHF unrevised	585-0400-003
	RF board assembly, VHF revised	585-5100-003
	RF board assy, UHF unrevised	587-0400-005
	RF board assy, UHF revised	585-5100-005
	RF board assy, 800 MHz unrevised	587-5000-003
	RF board assy, 800 MHz revised	585-5100-009
A 216	Flex circuit, revised RF to logic bd	035-5100-050
EP 001	0.2 x 0.2 fish paper	018-1080-020
HW 001	Screw, 2-56 x 3/16 pan hd	575-1602-006
HW 002	Screw, 4-40 x 1/4 pan hd	575-1604-008

## Receiver/Exciter Assembly

Ref No.	Description	Part No.
HW 003	Lockwasher, internal	596-2102-006
HW 004	Washer, split lock #4 ZPS	596-1304-008
MP 002	Metal RF board housing	015-0970-004
MP 003	Cover for housing MP2	015-0970-005
MP 004	H-clip for RF board (unrevised bd)	017-2229-509
	Grounding clip (revised bd)	537-5001-005
P 001	Jumper, flex	515-9500-005
W 001	Coax assy, right angle	597-3008-001
<b>INTERCONNECT BOARD ASSEMBLY</b> Part No. 023-5300-050/-055		
C 001	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 002	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 003	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 004	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 005	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 007	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 008	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 009	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 010	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 011	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 012	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 014	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 016	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 017	.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3675-104
C 018	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 019	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 020	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 021	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 022	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 024	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 025	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 026	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 027	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 028	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 029	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 030	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
EP 001	Ferrite bead smd	517-2503-002
EP 002	Ferrite bead smd	517-2503-002
J 001	Connector, 2 x 10-pin (unrevised)	515-7113-070
	Connector, 20-pin ZIF (revised bd)	515-7111-520
J 002	Connector, 30-pin	515-7111-430
MP 011	Contact, power (unrevised bd)	013-1724-001

Ref No.	Description	Part No.
PC 001	PC board, interconnect (revised)	035-5300-050
PC 011	Flex circuit, power (unrevised bd)	035-1800-180
R 002	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
<b>UHF RX/EXCITER ASSEMBLY</b> <b>(VERSION C)</b> Part No. 023-5567-212		
A 001	Interconnect board assembly (see separate listing which follows)	023-5500-050
A 100	RF board assembly, UHF	585-5500-300
HW 001	Screw, 2-56 x 3/16 pan hd	575-1602-006
HW 002	Screw, 4-40 x 1/4 pan hd	575-1604-008
HW 003	Lockwasher, internal	596-2102-006
HW 004	Washer, split lock #4 ZPS	596-1304-008
MP 002	Metal RF board housing	015-0970-014
MP 003	Cover for housing MP2	015-0970-015
MP 004	Grounding clip	537-5001-005
W 001	Coax assy, right angle	597-3008-001
<b>INTERCONNECT BOARD ASSEMBLY</b> Part No. 023-5500-050		
C 001	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 002	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 005	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 007	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 008	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 009	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 011	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 012	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 014	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 016	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 017	.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3675-104
C 018	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 019	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 020	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 021	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 022	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 024	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 025	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 026	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390

## VHF 50W PA Board Assembly

Ref No.	Description	Part No.
C 027	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 028	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
C 029	39 pF $\pm 5\%$ NPO 50V cer smd	510-3674-390
EP 001	Ferrite bead smd	517-2503-002
EP 002	Ferrite bead smd	517-2503-002
J 001	Connector, 26-pin ZIF (revised bd)	515-7111-526
J 002	Connector, 30-pin	515-7111-430
PC 001	PC board, interconnect rev 1	035-5500-0501
R 005	0 ohm jumper	569-0165-001
R 007	0 ohm jumper	569-0165-001
R 008	0 ohm jumper	569-0165-001

**VHF 50W PA BOARD ASSEMBLY**  
**Part No. 023-5315-521 (100W Models)**  
**Part No. 023-5315-531 (50W Models)**

C 501	12 pF $\pm 10\%$ 50V high Q smd	510-3663-120
C 502	10 pF 250V mini mica (-521)	510-0019-100
	10 pF $\pm 10\%$ 50V hi Q smd (-531)	510-3663-100
C 503	22 pF $\pm 10\%$ 50V high Q smd	510-3663-220
C 504	12 pF 250V mini mica (-521)	510-0019-120
	12 pF $\pm 10\%$ 50V hi Q smd (-531)	510-3663-120
C 505	22 pF $\pm 10\%$ 50V high Q smd	510-3663-220
C 506	10 pF 250V mini mica (-521)	510-0019-100
	10 pF $\pm 10\%$ 50V hi Q smd (-531)	510-3663-100
C 507	8.2 pF $\pm 10\%$ 50V high Q smd	510-3663-829
C 508	300 pF $\pm 10\%$ 50V high Q smd	510-3663-301
C 509	12 pF $\pm 10\%$ 50V high Q smd	510-3663-120
C 510	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 511	300 pF $\pm 10\%$ 50V high Q smd	510-3663-301
C 512	33 pF $\pm 5\%$ NPO 50V cer smd	510-3615-330
C 513	12 pF $\pm 5\%$ NPO 50V cer smd	510-3615-120
C 515	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 516	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 517	51 pF $\pm 5\%$ NPO 50V cer (-531)	510-3601-510
	51 pF $\pm 5\%$ NPO 50V cer (-521)	510-3615-510
C 518	.01 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-103
C 519	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 520	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 521	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 522	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 523	33 pF $\pm 5\%$ NPO 50V cer smd	510-3615-330

Ref No.	Description	Part No.
C 524	120 pF $\pm 5\%$ NPO 50V cer smd	510-3601-121
C 526	.01 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-103
C 527	30 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 528	.01 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-103
C 529	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 530	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 531	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 532	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 533	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 534	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 535	240 pF $\pm 5\%$ NPO 50V cer smd	510-3615-241
C 536	51 pF $\pm 5\%$ NPO 50V cer smd	510-3601-510
C 537	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 538	150 pF $\pm 5\%$ NPO 50V cer smd	510-3601-151
C 540	4.7 $\mu$ F 25V tantalum smd	510-2627-479
C 541	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 542	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 543	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 544	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 545	130 pF $\pm 10\%$ 50V high Q smd (revised bd)	510-3663-131
	120 pF $\pm 10\%$ 50V high Q smd (unrevised bd)	510-3663-121
C 546	120 pF $\pm 10\%$ 50V high Q smd	510-3663-121
C 547	150 pF $\pm 10\%$ 50V high Q (-521)	510-3663-151
	220 pF $\pm 10\%$ 50V high Q (-531) (revised bd)	510-3663-221
	100 pF $\pm 10\%$ 50V high Q smd (unrevised bd)	510-3663-101
C 548	300 pF $\pm 10\%$ 50V high Q smd	510-3663-301
C 549	220 pF $\pm 10\%$ 50V high Q smd	510-3663-221
C 550	220 pF $\pm 10\%$ 50V high Q smd	510-3663-221
C 551	220 pF $\pm 10\%$ 50V high Q smd	510-3663-221
C 552	220 pF $\pm 10\%$ 50V high Q smd	510-3663-221
C 553	220 pF $\pm 10\%$ 50V high Q smd	510-3663-221
C 554	56 pF $\pm 10\%$ 50V high Q smd (revised bd)	510-3663-560
	300 pF 250V mini mica (unrevised bd)	510-0019-301
C 555	56 pF $\pm 10\%$ 50V high Q smd (revised bd)	510-3663-560
	300 pF 250V mini mica (unrevised bd)	510-0019-301
C 556	120 pF $\pm 10\%$ 50V high Q smd (revised bd)	510-3663-121

## VHF 50W PA Board Assembly (Cont'd)

Ref No.	Description	Part No.
C 557	240 pF 250V mini mica (unrevised bd)	510-0019-241
	120 pF $\pm 10\%$ 50V high Q smd (revised bd)	510-3663-121
C 558	240 pF 250V mini mica (unrevised bd)	510-0019-241
	100 pF $\pm 10\%$ 50V high Q smd (revised bd)	510-3663-101
C 559	100 pF 250V mini mica (unrevised bd)	510-0019-101
	100 pF $\pm 10\%$ 50V high Q smd (revised bd)	510-3663-101
C 560	100 pF 250V mini mica (unrevised bd)	510-0019-101
	39 pF $\pm 10\%$ 50V high Q (-531) or	510-3663-390
	33 pF $\pm 10\%$ 50V high Q (-531) or	510-3663-330
	43 pF $\pm 10\%$ 50V high Q (-531) or	510-3663-430
	47 pF $\pm 10\%$ 50V high Q (-531)	510-3663-470
C 561	43 pF $\pm 10\%$ 50V high Q (-521) (revised bd)	510-3663-430
	43 pF 250V mini mica (unrevised bd)	510-0019-430
C 561	0.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 562	300 pF $\pm 10\%$ 50V high Q smd	510-3663-301
C 563	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 564	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 565	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 566	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 567	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 568	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 569	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 570	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 571	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 572	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 573	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 574	1500 $\mu$ F 25V electrolytic	510-4055-152
C 577	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 579	10 $\mu$ F 25V tantalum smd	510-2627-100
C 580	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 581	.01 $\mu$ F $\pm 5\%$ X7R 50V cer smd	510-3609-103
C 582	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 583	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 585	470 $\mu$ F 16V electrolytic	510-4056-471
C 588	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105

Ref No.	Description	Part No.
C 589	470 $\mu$ F 16V electrolytic	510-4056-471
C 590	1500 $\mu$ F 25V electrolytic	510-4055-152
C 591	.01 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-103
C 593	.001 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-102
C 594	.001 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-102
C 597	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 598	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 599	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 600	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 608	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 609	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 611	27 pF $\pm 10\%$ 50V high Q smd	510-3663-270
C 612	56 pF $\pm 10\%$ 50V high Q smd	510-3663-560
C 613	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 614	47 pF $\pm 10\%$ 50V high Q smd	510-3663-470
C 615	47 pF $\pm 10\%$ 50V high Q smd	510-3663-470
C 616	150 pF $\pm 10\%$ 50V high Q smd	510-3663-151
C 617	150 pF $\pm 10\%$ 50V high Q smd	510-3663-151
C 618	200 pF $\pm 10\%$ 50V high Q smd	510-3663-201
C 620	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 621	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 622	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 650	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 655	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 660	27 pF $\pm 10\%$ 50V high Q smd	510-3663-270
C 680	300 pF $\pm 5\%$ NPO 50V cer smd	510-3602-301
CR 501	Pin diode	523-1504-032
CR 502	Pin diode	523-1504-032
CR 503	Pin switching diode	523-1504-001
CR 506	Switching diode SOT-23	523-1504-002
CR 508	Switching diode SOT-23	523-1504-002
CR 509	Switching diode SOT-23	523-1504-002
CR 510	HC diode	523-1504-016
CR511	Pin switching diode	523-1504-001
CR 512	Pin switching diode	523-1504-001
CR 513	Pin switching diode	523-1504-001
CR 514	Transient suppressor	523-2906-001
CR 515	Schottky power 3A,40V	523-0519-032
EP 501	Ferrite bead smd	517-2503-010
EP 502	Ferrite bead smd	517-2503-010
EP 503	Ferrite bead smd	517-2503-002
J 501	Connector, 20-pin	515-7111-230

## VHF 50W PA Board Assembly (Cont'd)

Ref No.	Description	Part No.
J 502	Connector, SMT receptacle	515-7111-470
L 501	2T inductor	016-0020-082
L 502	2T inductor	016-0020-082
L 503	2T inductor	016-0020-082
L 504	10T inductor	016-0020-050
L 505	10T inductor	542-0030-010
L 506	1.0 $\mu$ H $\pm$ 5% smd	542-9000-109
L 507	1.0 $\mu$ H $\pm$ 5% smd	542-9000-109
L 509	10T 43 nH smd	542-0030-010
L 510	10T 43 nH smd	542-0030-010
L 511	4T nH inductor	542-0020-034
L 512	330 nH inductor smd	542-9003-338
L 514	10T 43 nH smd	542-0030-010
L 515	10T 43 nH smd	542-0030-010
L 516	Air dielectric inductor	016-0020-058
L 517	4T .08 diameter inductor	542-0020-034
L 518	4T.08 diameter inductor	542-0020-034
L 519	70 $\mu$ H DC line filter	542-5010-003
L 520	100 $\mu$ H 3A torrid inductor	542-5010-016
L 521	50 $\mu$ H 3A torrid inductor	542-5010-013
MP 501	Line choke tie-down bracket	017-9700-005
PC 501	PA board, VHF rev 7	035-5315-500 7
Q 501	NPN general purpose	576-0003-658
Q 504	NPN general purpose	576-0003-658
Q 505	NPN general purpose	576-0003-658
Q 506	PNP power Darlington amp	576-0007-013
Q 507	NPN general purpose	576-0003-658
Q 508	NPN general purpose	576-0003-658
Q 509	NPN RF power	576-0004-111
Q 510	NPN RF power 75W, 175 MHz	576-0004-053
Q 511	PNP power Darlington	576-0007-013
Q 512	PNP switching	576-0003-612
Q 513	NPN general purpose	576-0003-658
Q 514	NPN general purpose	576-0003-658
R 501	220k ohm $\pm$ 5% 1/8W smd	569-0105-224
R 502	220k ohm $\pm$ 5% 1/8W smd	569-0105-224
R 503	220 ohm $\pm$ 5% 1/8W smd	569-0105-221
R 505	100 ohm $\pm$ 5% 1W smd	569-0175-101
R 506	100 ohm $\pm$ 5% 1W smd	569-0175-101
R 507	220k ohm $\pm$ 5% 1/8W smd	569-0105-224
R 508	4.7k ohm $\pm$ 5% 1/8W smd	569-0105-472

Ref No.	Description	Part No.
R 509	68k ohm $\pm$ 5% 1/8W smd	569-0105-683
R 510	2k ohm $\pm$ 5% 1/8W smd	569-0105-202
R 511	0 ohm jumper	569-0105-001
R 512	0 ohm jumper	569-0105-001
R 513	3.9k ohm $\pm$ 5% 1/8W smd	569-0105-392
R 519	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 520	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 521	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 522	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 523	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 524	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 525	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 526	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 527	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 528	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 529	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 530	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 531	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 532	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 533	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 534	220k ohm $\pm$ 5% 1/8W smd	569-0105-224
R 535	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 536	2.2k ohm $\pm$ 5% 1/8W smd	569-0105-222
R 537	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 538	18k ohm $\pm$ 5% 1/8W smd	569-0105-183
R 539	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 540	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 541	1.8k ohm $\pm$ 5% 1/8W smd	569-0105-182
R 542	1.0k ohm $\pm$ 5% 1/8W smd	569-0105-102
R 543	4.3k ohm $\pm$ 5% 1/8W smd	569-0105-432
R 544	4.3k ohm $\pm$ 5% 1/8W smd	569-0105-432
R 545	6.2k ohm $\pm$ 5% 1/8W smd	569-0105-622
R 546	330 ohm $\pm$ 5% 1/8W smd	569-0105-331
R 547	470k ohm $\pm$ 5% 1/8W smd	569-0105-474
R 548	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 549	20k ohm $\pm$ 5% 1/8W smd	569-0105-203
R 550	1.0k ohm $\pm$ 5% 1/8W smd	569-0105-102
R 551	18k ohm $\pm$ 5% 1/8W smd	569-0105-183
R 552	68k ohm $\pm$ 5% 1/8W smd	569-0105-683
R 553	1.0k ohm $\pm$ 5% 1/8W smd	569-0105-102
R 554	100 ohm $\pm$ 5% 1/8W smd (-531) 0 ohm jumper (-521)	569-0105-101 569-0105-001
R 555	4.7k ohm $\pm$ 5% 1/8W smd	569-0105-472
R 556	10 ohm $\pm$ 5% 1W smd	569-0175-100
R 557	100 ohm $\pm$ 5% 1W smd	569-0175-101



## VHF 50W PA Board Assembly (Cont'd)

Ref No.	Description	Part No.
R 558	18k ohm $\pm 5\%$ 1/8W smd	569-0105-183
R 559	51 ohm $\pm 5\%$ 1W smd	569-0175-510
R 560	51 ohm $\pm 5\%$ 1W smd	569-0175-510
R 561	.015 ohm $\pm 5\%$ 2W smd	569-2020-157
R 562	200 ohm $\pm 5\%$ 1/8W smd	569-0115-201
R 563	200 ohm $\pm 5\%$ 1/8W smd	569-0115-201
R 564	4.7k ohm $\pm 5\%$ 1/8W smd (-531)	569-0115-472
	5.1k ohm $\pm 5\%$ 1/8W smd (-521)	569-0115-512
R 565	330 ohm $\pm 5\%$ 1/8W smd	569-0105-331
R 566	100 ohm $\pm 5\%$ 0.75W smd	569-0135-101
R 567	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 568	39k ohm $\pm 5\%$ 1/8W smd (-531)	569-0105-394
	15k ohm $\pm 5\%$ 1/8W smd (-521)	569-0105-153
	(revised bd)	
	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
	(unrevised bd)	
R 569	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 570	470 ohm $\pm 5\%$ 1/8W smd	569-0105-471
R 571	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 572	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 573	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 574	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 575	560 ohm $\pm 5\%$ 1/8W smd	569-0105-561
R 576	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 577	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 578	3.01k ohm $\pm 1\%$ 1/8W smd	569-0111-347
R 579	1.27k ohm 1% 1/8W smd	569-0111-311
R 580	680 ohm $\pm 5\%$ 1/8W smd	569-0105-681
R 581	18k ohm $\pm 5\%$ 1/8W smd	569-0105-183
R 582	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 583	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 584	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 585	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 586	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 587	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 588	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 589	820 ohm $\pm 5\%$ 1/8W smd	569-0105-821
RT 501	Thermistor, 10k ohm $\pm 5\%$ smd	569-3013-007
U 501	Shift reg, 8-stage MC4094	544-3016-094
U 502	Op amp, dual LM2904	544-2019-004
U 505	Current sense amp MAX472ESA	544-2039-002
U 506	Switching regulator, 3A MC33166	544-2003-102
U 507	Op amp, dual LM2904	544-2019-004

## VHF 100W PA Board Assembly

Ref No.	Description	Part No.
<b>VHF 100W PA BOARD ASSEMBLY</b>		
<b>Part No. 023-5315-510</b>		
A 120	Power pigtail cable assembly includes:	023-5315-120
	Housing, 75-amp red	515-9032-559
	Contact, 50-amp 10/12 AWG	515-9032-561
	Housing, 75-amp black	515-9032-557
	Connector boot, power 8 AWG	574-9025-015
	Power cable	597-2002-236
C 002	20 pF 250V mini mica	510-0020-200
C 003	43 pF 250V mini mica	510-0019-430
C 005	180 pF 250V mini mica	510-0019-181
C 006	180 pF 250V mini mica	510-0019-181
C 007	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 008	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 009	22 $\mu$ F 16V tantalum smd	510-2625-220
C 010	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 011	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 013	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 014	270 pF 250V mini mica	510-0019-271
C 015	270 pF 250V mini mica	510-0019-271
C 017	82 pF 250V mini-mica	510-0019-820
C 018	56 pF 250V mini mica	510-0019-560
C 019	14 pF 250V mini mica	510-0019-140
C 021	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 023	20 pF 250V mini mica	510-0020-200
C 024	47 pF 250V mini mica	510-0019-470
C 026	180 pF 250V mini mica	510-0019-181
C 027	180 pF 250V mini mica	510-0019-181
C 028	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 029	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 030	22 $\mu$ F 16V tantalum smd	510-2625-220
C 031	300 pF $\pm 5\%$ NPO 50V cer smd	510-3615-301
C 032	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 034	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 035	270 pF 250V mini mica	510-0019-271
C 036	270 pF 250V mini mica	510-0019-271
C 038	82 pF 250V mini mica	510-0019-820
C 039	56 pF 250V mini mica	510-0019-560
C 040	14 pF 250V mini mica	510-0019-140
CH 151	100-watt heat sink 5300	015-0970-013
CR 001	Transient suppressor	523-2906-001

**VHF 100W PA Board Assembly**

Ref No.	Description	Part No.
EP 001	Insulator, high power resistor	018-1136-146
	Ferrite bead smd	517-2503-010
EP 002	Insulator, DC leads	018-1136-148
	Ferrite bead smd	517-2503-010
EP 003	Ferrite bead smd	517-2503-010
	Terminal lug	586-0005-106
EP 004	Ferrite bead smd	517-2503-010
EP 006	Eyelet	031-0313-001
EP 007	Eyelet	031-0313-001
F 001	Fuse, 15A 32V	534-0332-015
FH 001	Fuse clip	534-1007-006
FH 002	Fuse clip	534-1007-006
HW 001	Screw, #6 x 1/4 torx zps	575-1006-008
HW 002	Screw, 4-40 x 1/4 pan head zps	575-1604-008
HW 003	Screw, 6-32 x 3/8 flat head	575-8206-012
HW 004	Screw, 8-32 x 3/8 hex soc cap blk	575-9076-012
HW 005	Screw, 2-56 x 3/8 pan hd	575-1602-012
HW 006	Screw, 4-40 x 5/16 pan hd zps ph	575-1604-010
HW 007	Washer, split lock #4 zps	596-1304-008
HW 008	Lock washer, internal 2 x .013 thk	596-2102-006
HW 010	.31 flag terminal	586-0004-004
HW 013	Stand-off, M-M 4-40 to 6-32	537-0140-008
HW 010	Nut, 4-40	560-2104-008
HW 010	Washer, No. 4 shakeproof	596-1104-008
L 001	3T .120 in ID smd inductor	542-0020-053
L 002	1T .140 in ID 18 awg inductor	542-0020-061
L 003	10T 43.0 nH smd inductor	542-0030-010
L 004	8T .120 in ID smd inductor	542-0020-058
L 005	8T .120 in ID smd inductor	542-0020-058
L 006	1T .060 in ID smd inductor	542-0020-011
L 007	1T .120 in ID 18 awg inductor	542-0020-051
L 008	3T .120 in ID smd inductor	542-0020-053
L 009	3T .120 in ID smd inductor	542-0020-053
L 010	1T .140 in ID 18 awg inductor	542-0020-061
L 011	10T 43.0 nH smd inductor	542-0030-010
L 012	8T .120 in ID smd inductor	542-0020-058
L 013	8T .120 in ID smd inductor	542-0020-058
L 014	1T .060 in ID smd inductor	542-0020-011
L 015	1T .120 in ID 18 awg inductor	542-0020-051
L 016	3T .120 in ID smd inductor	542-0020-053
L 017	10 $\mu$ H RF choke	542-4503-100

**UHF 15W PA Board Assembly**

Ref No.	Description	Part No.
MP 153	Coax gasket	018-1136-144
PC 001	PC board, 100W PA	035-5315-5102
Q 001	100W VHF amp	576-0004-147
Q 002	100W VHF amp	576-0004-147
R 001	100 ohm $\pm$ 5% 1W smd	569-0175-101
R 002	100 ohm $\pm$ 5% 1W smd	569-0175-101
R 003	100 ohm $\pm$ 5% 1W smd	569-0175-101
R 004	100 ohm $\pm$ 5% 1W smd	569-0175-101
R 005	High power resistor, 50 watt	569-5003-003
R 006	High power resistor, 150 watt	569-5003-001
RT 001	Thermistor, 10k ohm smd	569-3013-007
U 001	Hybrid coupler, 130-180 MHz	585-2001-001
U 002	Hybrid coupler, 130-180 MHz	585-2001-001
W 120	Coax, double shld RG 316/U	597-3002-011
W 500	Coax .141 dia.	597-3001-011
W 501	Power cable, RF to PA board	597-2002-238
W 502	RF pigtail cable	597-2002-239
W 5xx	DC power cable assembly	See A120

**UHF 15W PA BOARD ASSEMBLY**  
**Part No. 023-5335-511**

C 500	.01 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-103
C 502	100 pF $\pm$ 5% NPO 50V cer smd	510-3615-101
C 503	100 pF $\pm$ 5% NPO 50V cer smd	510-3615-101
C 504	.01 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-103
C 505	.001 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-102
C 506	.01 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-103
C 507	1 $\mu$ F $\pm$ 10% X7R 16V cer smd	510-3606-105
C 508	100 pF $\pm$ 5% NPO 50V cer smd	510-3615-101
C 509	.001 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-102
C 513	100 pF $\pm$ 5% NPO 50V cer smd	510-3615-101
C 514	.01 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-103
C 515	100 pF NPO $\pm$ 5% 50V cer smd	510-3601-101
C 516	100 pF $\pm$ 5% NPO 50V cer smd	510-3615-101
C 517	100 pF $\pm$ 5% NPO 50V cer smd	510-3601-101
C 518	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104

## UHF 15W PA Board Assembly (Cont'd)

Ref No.	Description	Part No.
C 519	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 520	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 521	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 522	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 523	5.1 pF $\pm 5\%$ NPO 50V cer smd	510-3615-519
C 524	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 525	7.5 pF $\pm 5\%$ NPO 50V cer smd	510-3615-759
C 526	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 528	5.1 pF $\pm 5\%$ NPO 50V cer smd	510-3615-519
C 529	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 532	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 533	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 534	1.0 pF $\pm 10\%$ 50V high Q smd	510-3663-109
C 535	3.9 pF $\pm 10\%$ 50V high Q smd	510-3663-399
C 536	5.1 pF $\pm 10\%$ 50V high Q smd	510-3663-519
C 537	5.1 pF $\pm 10\%$ 50V high Q smd	510-3663-519
C 538	3.9 pF $\pm 10\%$ 50V high Q smd	510-3663-399
C 539	4.7 pF $\pm 10\%$ 50V high Q smd	510-3663-479
C 540	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 541	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 542	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 543	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 544	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 545	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 546	6.8 uF 35V tantalum smd	510-2635-689
C 547	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 548	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 549	4.7 uF $\pm 10\%$ 25V tantalum smd	510-2627-479
C 551	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 552	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 553	12 pF $\pm 5\%$ NPO 50V cer smd	510-3615-120
C 554	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 555	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 556	.018 X7R $\pm 10\%$ 50V cer smd	510-3605-183
C 557	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 558	6.8 uF 35V tantalum smd	510-2635-689
C 559	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 560	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 561	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 562	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 563	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 564	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 565	8.2 pF $\pm 10\%$ 50V high Q smd	510-3663-829
C 566	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 567	27 pF $\pm 10\%$ 50V high Q smd	510-3663-270

Ref No.	Description	Part No.
C 567	56 pF $\pm 10\%$ 50V high Q smd	510-3663-560
C 568	15 pF $\pm 5\%$ NPO 50V cer smd	510-3615-150
C 569	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 570	24 pF $\pm 10\%$ 50V high Q smd	510-3663-240
C 571	56 pF $\pm 10\%$ 50V high Q smd	510-3663-560
C 572	100 pF $\pm 10\%$ 50V high Q smd	510-3663-101
C 573	47 pF $\pm 10\%$ 50V high Q smd	510-3663-470
C 574	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 575	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 576	51 pF $\pm 10\%$ 50V high Q smd	510-3663-510
C 577	51 pF $\pm 10\%$ 50V high Q smd	510-3663-510
C 578	4.7 pF $\pm 10\%$ 50V high Q smd	510-3663-479
C 579	5.6 pF $\pm 10\%$ 50V high Q smd	510-3663-569
C 580	56 pF $\pm 10\%$ 50V high Q smd	510-3663-560
C 581	3.9 pF $\pm 10\%$ 50V high Q smd	510-3663-399
C 582	24 pF $\pm 10\%$ 50V high Q smd	510-3663-240
C 583	15 pF $\pm 5\%$ NPO 50V cer smd	510-3615-150
C 584	56 pF $\pm 10\%$ 50V high Q smd	510-3663-560
C 585	15 pF $\pm 5\%$ NPO 50V cer smd	510-3615-150
C 586	20 pF $\pm 5\%$ NPO 50V cer smd	510-3615-200
C 587	.018 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-183
C 593	.018 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-183
C 594	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 595	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 596	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 597	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 598	.010 uF X7R $\pm 5\%$ cer smd	510-3609-103
C 599	1500 uF 25V alum electrolytic	510-4055-152
C 600	10 uF 25V tantalum smd	510-2627-100
C 601	470 uF 16V alum electrolytic	510-4056-471
C 602	.018 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-183
C 603	100 pF $\pm 5\%$ NPO 50V cer smd	510-3615-101
C 606	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 607	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 608	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 609	470 uF 16V alum electrolytic	510-4056-471
C 612	27 pF $\pm 10\%$ 50V high Q smd	510-3663-270
C 613	1800 pF X7R $\pm 10\%$ 50V cer smd	510-3605-182
C 650	22 pF $\pm 10\%$ 50V high Q smd	510-3663-220
CR 500	Switching diode	523-1504-002
CR 501	Pin diode	523-1504-032
CR 502	Switching diode	523-1504-002
CR 503	Pin switching diode	523-1504-001
CR 504	Switching diode	523-1504-002

## UHF 15W PA Board Assembly (Cont'd)

Ref No.	Description	Part No.
CR 505	Pin diode	523-1504-032
CR 506	Pin switching diode	523-1504-001
CR 507	Pin switching diode	523-1504-001
CR 508	Pin switching diode	523-1504-001
CR 509	HC diode	523-1504-016
CR 510	Transient suppressor	523-2906-001
EP 001	Ferrite bead smd	517-2503-010
EP 002	Ferrite bead smd	517-2503-010
EP 003	Ferrite bead smd	517-2503-010
EP 004	Ferrite bead smd	517-2503-010
EP 005	Ferrite bead smd	517-2503-010
EP 006	Ferrite bead smd	517-2503-002
EP 510	Ferrite bead smd	517-2503-010
J 501	Connector, 20-pin	515-7111-230
J 502	Connector, SMT receptacle	515-7111-470
L 500	3T .100 in ID smd inductor	542-0020-043
L 501	3T .100 in ID smd inductor	542-0020-043
L 502	3T .080 in ID smd inductor	542-0020-033
L 503	4T .080 in ID smd inductor	542-0020-034
L 504	3T .080 in ID smd inductor	542-0020-033
L 505	4T .100 in ID smd inductor	542-0020-044
L 506	4T .100 in ID smd inductor	542-0020-044
L 507	1.0 uH $\pm 5\%$ smd inductor	542-9000-109
L 508	10T 43.0 nH smd inductor	542-0030-010
L 509	4T .100 in ID smd inductor	542-0020-044
L 511	4T .100 in ID smd inductor	542-0020-044
L 512	1.0 uH $\pm 5\%$ smd inductor	542-9000-109
L 513	9T 35.5 nH smd inductor	542-0030-009
L 514	9T 35.5 nH smd inductor	542-0030-009
L 515	10T 43.0 nH smd inductor	542-0030-010
L 517	DC line filter	542-5010-003
MP 501	Inductor shield	017-9700-005
PC 500	PC board, 15W UHF PA rev 1	035-5335-500 1
Q 500	PNP power Darlington TO-220	576-0007-013
Q 501	Silicon NPN gen purpose	576-0003-658
Q 502	Silicon NPN gen purpose	576-0003-658
Q 503	Silicon NPN gen purpose	576-0003-658
Q 504	Silicon NPN gen purpose	576-0003-658
Q 505	Silicon NPN gen purpose	576-0003-658

Ref No.	Description	Part No.
Q 506	Silicon NPN gen purpose	576-0003-658
Q 507	NPN 50 watts UHF	576-0004-205
Q 508	NPN 15 watts UHF	576-0004-207
Q 509	NPN 3 watts UHF	576-0004-209
Q 510	Silicon NPN gen purpose	576-0003-658
Q 511	PNP power Darlington TO-220	576-0007-013
Q 512	PNP switching	576-0003-612
R 500	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 501	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 502	2.2k ohm $\pm 5\%$ 1/8W smd	569-0105-222
R 503	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 504	3.9k ohm $\pm 5\%$ 1/8W smd	569-0105-392
R 505	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 506	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 507	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 508	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 510	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 511	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 512	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 513	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 514	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 515	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 516	1.8k ohm $\pm 5\%$ 1/8W smd	569-0105-182
R 517	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 518	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 519	18k ohm $\pm 5\%$ 1/8W smd	569-0105-183
R 520	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 521	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 522	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 523	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 524	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 525	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 526	2.0k ohm $\pm 5\%$ 1/8W smd	569-0105-202
R 527	Zero ohm $\pm 5\%$ 1/8W smd	569-0105-001
R 528	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 529	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 530	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 531	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 532	100 ohm $\pm 5\%$ 1W smd	569-0175-101
R 533	100 ohm $\pm 5\%$ 1W smd	569-0175-101
R 534	4.3k ohm $\pm 5\%$ 1/8W smd	569-0105-432
R 535	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 536	470k ohm $\pm 5\%$ 1/8W smd	569-0105-474
R 537	4.7k ohm $\pm 5\%$ 1/8W smd	569-0105-472
R 538	4.7k ohm $\pm 5\%$ 1/8W smd	569-0105-472

## UHF 15W PA Board Assembly (Cont'd)

Ref No.	Description	Part No.
R 539	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 540	4.3k ohm $\pm 5\%$ 1/8W smd	569-0105-432
R 541	330 ohm $\pm 5\%$ 1/8W smd	569-0105-331
R 542	6.2k ohm $\pm 5\%$ 1/8W smd	569-0105-622
R 543	220 ohm $\pm 5\%$ 1/8W smd	569-0105-221
R 544	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 545	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 546	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 547	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 548	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 549	18k ohm $\pm 5\%$ 1/8W smd	569-0105-183
R 550	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 551	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 552	820 ohm $\pm 5\%$ 1/8W smd	569-0105-821
R 553	200 ohm $\pm 5\%$ 1/8W smd	569-0115-201
R 554	.030 ohm $\pm 5\%$ 2W wirewound	569-2019-307
R 555	200 ohm $\pm 5\%$ 1/8W smd	569-0115-201
R 556	470 ohm $\pm 5\%$ 1/8W smd	569-0105-471
R 557	4.7k ohm $\pm 5\%$ 1/8W smd	569-0115-472
R 558	18k ohm $\pm 5\%$ 1/8W smd	569-0105-183
R 559	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 560	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 561	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 562	18 ohm $\pm 5\%$ 1/8W smd	569-0115-180
R 563	470 ohm $\pm 5\%$ 1W smd	569-0175-471
R 564	470 ohm $\pm 5\%$ 1W smd	569-0175-471
R 565	680 ohm $\pm 5\%$ 1/8W smd	569-0105-681
R 566	470 ohm $\pm 5\%$ 1W smd	569-0175-471
R 567	100 ohm $\pm 5\%$ .75W smd	569-0135-101
R 568	300 ohm $\pm 5\%$ +/- 400 PPM smd	569-0116-301
R 569	300 ohm $\pm 5\%$ +/- 400 PPM smd	569-0116-301
R 570	18k ohm $\pm 5\%$ 1/8W smd	569-0105-183
R 571	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 572	330 ohm $\pm 5\%$ 1/8W smd	569-0105-331
R 573	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 574	10k ohm $\pm 5\%$ thermistor	569-3013-007
R 575	18k ohm $\pm 5\%$ 1/8W smd	569-0105-183
R 576	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 577	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 578	1.2k Ohm J 1206smd RI	569-0115-122
R 579	1.2k Ohm J 1206smd RI	569-0115-122
R 580	1.2k Ohm J 1206smd RI	569-0115-122
R 581	560 ohm $\pm 5\%$ 1/8W smd	569-0105-561
R 582	Zero ohm $\pm 5\%$ 1/8W smd	569-0105-001
R 583	Zero ohm $\pm 5\%$ 1/8W smd	569-0105-001

## UHF 40W PA Board Assembly

Ref No.	Description	Part No.
R 584	Zero ohm $\pm 5\%$ 1/8W smd	569-0105-001
U 501	Shift register, 8-stage MC4094	544-3016-094
U 502	Op amp, dual LM2904	544-2019-004
U 505	Current sense amp MAX472ESA	544-2039-002
U 507	Op amp, dual LM2904	544-2019-004
U 508	Regulator, 8V 3A MC78TO8CT	544-2003-095

**UHF 40W PA BOARD ASSEMBLY**  
**Part No. 023-5365-501**

C 002	240 pF, $\pm 5\%$ , high Q, smd	510-3667-241
C 003	240 pF, $\pm 5\%$ , high Q, smd	510-3667-241
C 004	8.2 pF, $\pm 5\%$ , high Q, 0805	510-3667-829
C 005	27 pF, $\pm 1\%$ , high Q, 0805	510-3661-270
C 006	27 pF, $\pm 1\%$ , high Q, 0805	510-3661-270
C 007	47 pF, $\pm 1\%$ , high Q, 0805	510-3661-470
C 008	47 pF, $\pm 1\%$ , high Q, 0805	510-3661-470
C 014	27 pF, $\pm 1\%$ , high Q, 0805	510-3661-270
C 015	27 pF, $\pm 1\%$ , high Q, 0805	510-3661-270
C 017	5.1 pF, $\pm 1$ pF, high Q, smd	510-3667-519
C 018	150 pF, $\pm 5\%$ , high Q, smd	510-3667-151
C 020	10 pF, $\pm 1\%$ , high Q, 0805	510-3661-100
C 021	10 pF, $\pm 1\%$ , high Q, 0805	510-3661-100
C 022	56 pF, $\pm 5\%$ , high Q, 0805	510-3667-560
C 026	27 pF, $\pm 1\%$ , high Q, 0805	510-3661-270
C 027	27 pF, $\pm 1\%$ , high Q, 0805	510-3661-270
C 028	3.9 pF, $\pm 1$ pF, high Q, smd	510-3667-399
C 029	3.9 pF, $\pm 1$ pF, high Q, smd	510-3667-399
C 030	5.1 pF, $\pm 1$ pF, high Q, smd	510-3667-519
C 106	150 pF $\pm 5\%$ NPO 1206 smd	510-3601-151
C 107	150 pF $\pm 5\%$ NPO 1206 smd	510-3601-151
C 108	150 pF $\pm 5\%$ NPO 1206 smd	510-3601-151
C 109	150 pF $\pm 5\%$ NPO 1206 smd	510-3601-151
C 111	150 pF $\pm 5\%$ NPO 1206 smd	510-3601-151
C 112	150 pF, $\pm 1\%$ , high Q, 0805	510-3661-151
C 113	150 pF, $\pm 1\%$ , high Q, 0805	510-3661-151
C 124	150 pF, $\pm 5\%$ , high Q, smd	510-3667-151
C 125	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 126	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 127	.001 $\mu$ F $\pm 5\%$ NPO 1206 smd	510-3602-102
C 128	150 pF, $\pm 5\%$ , high Q, smd	510-3667-151
C 129	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 130	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 131	150 pF $\pm 5\%$ NPO 50V cer smd	510-3601-151

## UHF 40W PA Board Assembly

Ref No.	Description	Part No.
C 132	.0047 $\mu$ F $\pm$ 10% smd	510-3606-472
C 133	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 141	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 142	.0047 $\mu$ F $\pm$ 10% smd	510-3606-472
C 143	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 144	150 pF, $\pm$ 5%, high Q, smd	510-3667-151
C 145	.018 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3605-183
C 146	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 147	.001 $\mu$ F $\pm$ 5% NPO 1206 smd	510-3602-102
C 148	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 149	.018 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3605-183
C 150	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 151	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 152	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 153	.018 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3605-183
C 154	470 $\mu$ F 16V electrolytic	510-4056-471
C 161	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 162	.0047 $\mu$ F $\pm$ 10% smd	510-3606-472
C 163	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 165	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 166	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 167	6.8 $\mu$ F 35V tantalum smd	510-2635-689
C 201	.018 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3605-183
C 202	150 pF, $\pm$ 1%, high Q, 0805	510-3661-151
C 203	1500 $\mu$ F 25V alum electrolytic	510-4055-152
C 204	.018 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3605-183
C 205	150 pF, $\pm$ 1%, high Q, 0805	510-3601-151
C 208	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 209	10 $\mu$ F 25V tantalum smd	510-2627-100
C 210	1 $\mu$ F $\pm$ 10% X7R 16V cer smd	510-3606-105
C 211	.01 $\mu$ F X7R $\pm$ 5% 50V cer smd	510-3609-103
C 212	470 $\mu$ F 16V electrolytic	510-4056-471
C 214	1 $\mu$ F $\pm$ 10% X7R 16V cer smd	510-3606-105
C 215	470 $\mu$ F 16V electrolytic	510-4056-471
C 216	1 $\mu$ F $\pm$ 10% X7R 16V cer smd	510-3606-105
C 217	6.8 pF, $\pm$ 1%, high Q, 0805	510-3661-689
C 218	24 pF, $\pm$ 1%, high Q, 0805	510-3661-240
C 220	33 pF, $\pm$ 1%, high Q, 0805	510-3661-330
C 221	39 pF, $\pm$ 1%, high Q, 0805	510-3661-390
C 223	24 pF, $\pm$ 1%, high Q, 0805	510-3661-240
C 224	18 pF, $\pm$ 1%, high Q, 0805	510-3661-180
C 227	47 pF, $\pm$ 1%, high Q, 0805	510-3661-470
C 228	8.2 pF, $\pm$ 1 pF, high Q, smd	510-3667-829
C 230	6.8 pF, $\pm$ 1%, high Q, 0805	510-3661-689
C 300	150 pF, $\pm$ 1%, high Q, smd	510-3666-151

Ref No.	Description	Part No.
C 301	3.9 pF, $\pm$ 1%, high Q, smd	510-3666-399
C 302	5.1 pF, $\pm$ 1%, high Q, smd	510-3666-519
C 303	5.6 pF, $\pm$ 1%, high Q, smd	510-3666-569
C 304	5.1 pF, $\pm$ 1%, high Q, smd	510-3666-519
C 305	3.9 pF, $\pm$ 1%, high Q, smd	510-3666-399
C 306	1.0 pF, $\pm$ 1 pF, high Q, smd	510-3667-109
C 307	240 pF, $\pm$ 5%, high Q, smd	510-3667-241
C 308	240 pF, $\pm$ 5%, high Q, smd	510-3667-241
C 401	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 402	4.7 pF, $\pm$ 1 pF, high Q, smd	510-3607-479
C 403	5.6 pF, $\pm$ 1 pF, high Q, smd	510-3607-569
C 404	33 pF $\pm$ 5% NPO cer smd	510-3601-330
C 405	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 406	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 407	100 pF, $\pm$ 5%, high Q, smd	510-3667-101
C 408	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 409	6.8 pF $\pm$ 5% NPO 50V cer smd	510-3601-689
C 410	6.8 pF $\pm$ 5% NPO 50V cer smd	510-3601-689
C 411	1 $\mu$ F $\pm$ 10% X7R 16V cer smd	510-3606-105
C 413	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 414	1 $\mu$ F $\pm$ 10% X7R 16V cer smd	510-3606-105
C 415	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 416	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 417	10 pF, $\pm$ 1%, high Q, cer smd	510-3661-100
C 501	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 502	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 503	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 504	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 505	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 506	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 507	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 508	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 509	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 510	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 511	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 512	.018 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3605-183
C 513	.01 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-103
C 514	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 516	.01 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-103
C 517	.01 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-103
C 518	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 519	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151
C 521	.01 $\mu$ F X7R $\pm$ 10% 50V cer smd	510-3605-103
C 522	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 523	150 pF $\pm$ 5% NPO 50V cer smd	510-3601-151

## UHF 40W PA Board Assembly

Ref No.	Description	Part No.
C 524	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
CR 101	Diode, Hipax Pin, F-1072t	523-1504-036
CR 102	Diode, Hipax Pin, F-1072t	523-1504-036
CR 103	Diode, Hipax Pin, F-1072t	523-1504-036
CR 104	Diode, Hipax Pin, F-1072t	523-1504-036
CR 105	HC diode	523-1504-016
CR 106	Diode, Hipax Pin, F-1072t	523-1504-036
CR 200	Zener overvoltage transient supp.	523-2907-016
CR 401	Pin switching diode	523-1504-001
CR 402	Diode, Hipax Pin, F-1072t	523-1504-036
CR 403	Pin switching diode	523-1504-001
CR 404	Diode, 1 amp, smd, fast recovery	523-1600-001
CR 501	Switching diode	523-1504-002
CR 502	Switching diode	523-1504-002
CR 503	Switching diode	523-1504-002
D 002	Diode, 5 amp, smd, fast recovery	523-1601-550
J 101	Connector, SMT receptacle	515-7111-470
J 102	Connector, 20-pin	515-7111-230
J 401	Connector, SMT receptacle	515-7111-470
L 001	220 nH inductor smd	542-9003-228
L 002	220 nH inductor smd	542-9003-228
L 003	220 nH inductor smd	542-9003-228
L 102	120 nH inductor smd	542-9003-128
L 103	120 nH inductor smd	542-9003-128
L 104	150 nH inductor smd	542-9003-158
L 109	8T .120 in ID smd inductor	542-0020-058
L 110	Ferrite bead smd	517-2503-010
L 111	Ferrite bead smd	517-2503-010
L 115	8T .120 in ID smd inductor	542-0020-058
L 116	Ferrite bead smd	517-2503-010
L 117	Ferrite bead smd	517-2503-010
L 120	10T inductor	016-0020-050
L 121	Ferrite bead smd	517-2503-010
L 122	Ferrite bead smd	517-2503-010
L 123	3T .080 in ID smd inductor	542-0020-033
L 124	3T .080 in ID smd inductor	542-0020-033
L 125	4T .080 in ID smd inductor	542-0020-034
L 126	3T .060 in ID smd inductor	542-0020-013
L 127	3T .060 in ID smd inductor	542-0020-013
L 200	DC line filter	542-5010-003
L 401	3T .100 in ID smd inductor	542-0020-043

Ref No.	Description	Part No.
L 402	3T .100 in ID smd inductor	542-0020-043
L 403	150 nH inductor smd	542-9003-158
L 404	220 nH inductor smd	542-9003-228
L 501	220 nH inductor smd	542-9003-228
L 503	.018 $\mu$ H inductor smd	542-9001-187
MP 001	Low-pass filter wrap-around	017-9700-010
PC 001	PC board, UHF 40W PA rev 2	035-5365-5002
Q 001	LDMOS FET, 35W 12.5V	576-0006-453
Q 005	Silicon NPN gen purpose	576-0003-658
Q 010	Dual-Device FET 70W 12.5V	576-0006-454
Q 200	PNP power Darlington amp	576-0007-013
Q 201	PNP switching	576-0003-612
Q 401	Silicon NPN gen purpose	576-0003-658
Q 403	Silicon NPN gen purpose	576-0003-658
Q 501	Silicon NPN gen purpose	576-0003-658
Q 502	PNP switching	576-0003-612
Q 503	Silicon NPN gen purpose	576-0003-658
Q 504	PNP switching	576-0003-612
R 004	100 ohm $\pm$ 5% 1/8W smd	569-0105-101
R 005	470 ohm $\pm$ 5% 1W smd	569-0175-471
R 006	22 ohm $\pm$ 5% 1W smd	569-0175-220
R 007	22 ohm $\pm$ 5% 1W smd	569-0175-220
R 008	470 ohm $\pm$ 5% 1W smd	569-0175-471
R 009	10 ohm $\pm$ 5% 1W smd	569-0175-100
R 107	1.2k ohm $\pm$ 5% 1/8W smd	569-0105-122
R 109	100 ohm $\pm$ 5% 1/8W smd	569-0105-101
R 110	100 ohm $\pm$ 5% 1/8W smd	569-0105-101
R 111	100 ohm $\pm$ 5% 1/8W smd	569-0105-101
R 112	100 ohm $\pm$ 5% 1/8W smd	569-0105-101
R 113	100 ohm $\pm$ 5% 1/8W smd	569-0105-101
R 114	1.0k ohm $\pm$ 5% 1/8W smd	569-0105-102
R 115	180 ohm $\pm$ 5% 1/8W smd	569-0105-181
R 117	620 ohm $\pm$ 5% 1/8W smd	569-0105-621
R 118	390 ohm $\pm$ 5% 1/8W smd	569-0105-391
R 119	620 ohm $\pm$ 5% 1/8W smd	569-0105-621
R 120	470 ohm $\pm$ 5% 1/8W smd	569-0105-471
R 122	620 ohm $\pm$ 5% 1/8W smd	569-0105-621
R 123	390 ohm $\pm$ 5% 1/8W smd	569-0105-391
R 124	1.2k ohm $\pm$ 5% 1/8W smd	569-0105-122
R 125	100 ohm $\pm$ 5% 1/8W smd	569-0115-101
R 126	100 ohm $\pm$ 5% 1/8W smd	569-0105-101
R 127	220k ohm $\pm$ 5% 1/8W smd	569-0105-224

## UHF 40W PA Board Assembly

Ref No.	Description	Part No.
R 128	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 129	4.3k ohm $\pm 5\%$ 1/8W smd	569-0105-432
R 130	51 ohm $\pm 5\%$ 1/8W smd	569-0115-510
R 131	51 ohm $\pm 5\%$ 1/8W smd	569-0115-510
R 132	.005 ohm $\pm 5\%$ 2W smd	569-2019-057
R 133	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 134	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 135	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 136	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 137	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 138	470 ohm $\pm 5\%$ 1/8W smd	569-0105-471
R 139	51 ohm $\pm 5\%$ 1/8W smd	569-0105-510
R 140	390 ohm $\pm 5\%$ 1/8W smd	569-0105-391
R 141	470 ohm $\pm 5\%$ 1/8W smd	569-0105-471
R 142	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 200	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 201	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 202	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 203	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 204	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 205	560 ohm $\pm 5\%$ 1/8W smd	569-0105-561
R 300	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 400	510 ohm $\pm 5\%$ 1/8W smd	569-0105-511
R 401	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 402	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 403	560 ohm $\pm 5\%$ 1/8W smd	569-0105-561
R 404	51 ohm $\pm 5\%$ 1W smd	569-0175-510
R 406	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 407	510 ohm $\pm 5\%$ 1/8W smd	569-0105-511
R 408	510 ohm $\pm 5\%$ 1/8W smd	569-0105-511
R 409	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 410	1.8k ohm $\pm 5\%$ 1/8W smd	569-0105-182
R 411	510 ohm $\pm 5\%$ 1/8W smd	569-0105-511
R 412	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 501	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 502	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 503	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 504	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 505	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 506	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 507	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 508	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 509	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 510	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 511	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103

## 800 MHz 35W PA Board Assembly

Ref No.	Description	Part No.
R 512	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 513	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 514	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 515	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 516	Zero ohm $\pm 5\%$ 1/8W smd	569-0115-001
R 517	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 519	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 520	2.2k ohm $\pm 5\%$ 1/8W smd	569-0105-222
R 522	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 523	1.8k ohm $\pm 5\%$ 1/8W smd	569-0105-182
R 524	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 525	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 526	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 527	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 528	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 529	5.1k ohm $\pm 5\%$ 1/8W smd	569-0105-512
R 530	100k ohm $\pm 1\%$ 1/8W smd	569-0101-501
R 531	120 ohm $\pm 5\%$ 1/8W smd	569-0105-121
R 532	4.3k ohm $\pm 5\%$ 1/8W smd	569-0105-432
R 533	4.3k ohm $\pm 5\%$ 1/8W smd	569-0105-432
R 534	0 ohm jumper	569-0105-001
R 535	20k ohm $\pm 1\%$ .1W smd	569-0101-430
R 536	110k ohm $\pm 1\%$ .1W smd	569-0101-503
RT 501	10k ohm $\pm 5\%$ , thermistor, smd	569-3013-007
U 102	Current sense amp MAX472ESA	544-2039-002
U 201	Regulator, adj 5A MIC29503BT	544-2500-001
U 501	Shift reg, 8-stage MC4094	544-3016-094
U 502	Op amp, dual LM2904	544-2019-004

**800 MHZ PA BOARD ASSEMBLY**

Part No. 023-5385-501

C 501	3.9 pF $\pm 10\%$ 50V high Q smd	510-3653-399
C 502	7.5 pF $\pm 10\%$ 50V high Q smd	510-3663-399
C 503	1.0 pF $\pm 5\%$ NPO 50V cer smd	510-3615-109
C 504	7.5 pF $\pm 10\%$ 50V high Q smd	510-3663-399
C 505	3.9 pF $\pm 10\%$ 50V high Q smd	510-3653-399
C 506	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 507	9.1 pF $\pm 5\%$ NPO 50V cer smd	510-3615-919
C 508	1.8 pF $\pm 5\%$ NPO 50V cer smd	510-3615-189
C 509	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 510	2.2 pF $\pm 5\%$ NPO 50V cer smd	510-3615-229



## 800 MHz 35W PA Board Assembly

Ref No.	Description	Part No.
C 511	56 pF $\pm 10\%$ 50V high Q smd	510-3653-560
C 513	1.8 pF $\pm 5\%$ NPO 50V cer smd	510-3615-189
C 514	12 pF $\pm 5\%$ NPO 50V cer smd	510-3601-120
C 515	8.2 pF $\pm 5\%$ NPO 50V cer smd	510-3615-829
C 516	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 517	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 518	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 519	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 521	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 522	2.2 pF $\pm 5\%$ NPO 50V cer smd	510-3615-229
C 524	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 525	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 526	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 527	.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3606-104
C 528	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 529	.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3606-104
C 530	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 531	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 532	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 533	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 534	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 535	12 pF $\pm 5\%$ NPO 50V cer smd	510-3601-120
C 536	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 537	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 538	5.6 pF $\pm 5\%$ NPO 50V cer smd	510-3601-569
C 539	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 540	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 541	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 542	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 543	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 544	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 545	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 546	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 547	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 548	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 549	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 550	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 551	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 552	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 553	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 554	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 555	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 556	3.0 pF $\pm 5\%$ NPO 50V cer smd	510-3615-309
C 557	10 pF 250V mini mica	510-0019-100
C 558	12 pF 250V mini mica	510-0019-120

Ref No.	Description	Part No.
C 559	18 pF 250V mini mica	510-0019-180
C 560	0.01 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-103
C 561	18 pF 250V mini mica	510-0019-180
C 562	4 pF 250V mini mica	510-0019-409
C 563	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 564	.01 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-103
C 565	56 pF $\pm 10\%$ 50V hi Q smd	510-3653-560
C 566	1.0 to 4.5 pF smd variable	512-1008-001
C 567	12 pF $\pm 5\%$ NPO 50V cer smd	510-3615-120
C 568	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 569	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 570	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 571	1500 $\mu$ F 25V electrolytic	510-4055-152
C 572	100 pF $\pm 5\%$ NPO 50V cer smd	510-3601-101
C 573	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 577	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 579	10 $\mu$ F 25V tantalum smd	510-2627-100
C 580	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 581	.01 $\mu$ F X7R $\pm 5\%$ 50V cer smd	510-3609-103
C 585	470 $\mu$ F 16V electrolytic	510-4056-471
C 586	470 $\mu$ F 16V electrolytic	510-4056-471
C 589	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 590	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 591	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 592	39 pF $\pm 5\%$ NPO 50V cer smd	510-3615-390
C 593	.01 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3605-103
C 594	470 $\mu$ F 16V electrolytic	510-4056-471
C 595	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 596	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 597	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 598	5.1 pF $\pm 5\%$ NPO 50V cer smd	510-3601-519
C 599	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 601	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 602	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 604	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 605	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 606	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 607	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 608	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 609	.018 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3605-183
C 610	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 611	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 612	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 613	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 614	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390

## 800 MHz 35W PA Board Assembly

Ref No.	Description	Part No.
C 615	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 616	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 617	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 618	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 619	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 620	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 621	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 622	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 623	1 $\mu$ F $\pm 10\%$ X7R 16V cer smd	510-3606-105
C 624	39 pF $\pm 5\%$ NPO 50V cer smd	510-3601-390
C 625	3.9 pF $\pm 10\%$ 50V hi Q smd	510-3653-399
C 626	3.9 pF $\pm 10\%$ 50V hi Q smd	510-3653-399
C 627	2.7 pF $\pm 5\%$ NPO 50V cer smd	510-3615-279
C 628	470 $\mu$ F 35V electrolytic	510-4035-471
CR 501	Pin diode	523-1504-032
CR 502	Pin diode	523-1504-032
CR 503	Pin switching diode	523-1504-001
CR 504	Switching diode SOT-23	523-1504-002
CR 505	Switching diode SOT-23	523-1504-002
CR 507	Switching diode SOT-23	523-1504-002
CR 508	10V zener diode SOT-23	523-2016-100
CR 509	HC diode SOT-23	523-1504-016
CR 510	Transient suppressor, axial	523-2906-001
CR 516	Pin diode	523-1504-032
CR 517	Hc diode SOT-23	523-1504-016
CR 518	Pin diode	523-1504-032
CR 519	Pin diode	523-1504-032
CR 520	3.3V zener SOT-23	523-2016-339
CR 521	HC diode SOT-23	523-1504-016
CR 522	Switching diode SOT-23	523-1504-002
CR 523	Diode, 50V, 3 A IN5400	523-0019-003
CR 524	Diode, zener low level	523-2519-066
EP 501	Ferrite bead smd	517-2503-010
EP 502	Ferrite bead smd	517-2503-010
EP 503	Ferrite bead smd	517-2503-010
J 501	Connector, 20-pin	515-7111-230
J 502	Connector, SMT Receptacle	515-7111-470
L 501	8.0nH smd air core	542-0030-003
L 502	8.0nH smd air core	542-0030-003
L 503	12 nH smd	542-9003-127
L 504	15 nH smd	542-9003-157

Ref No.	Description	Part No.
L 505	15 nH smd	542-9003-157
L 506	9T, 35.5 nH smd	542-0030-009
L 507	8T 22 AWG. 090 ID smd	542-0016-008
L 508	8T 22 AWG. 090 ID smd	542-0016-008
L 509	DC line filter	542-5010-003
L 510	4.7 nH smd inductor	542-9000-476
L 511	12 nH smd	542-9003-127
L 514	15 nH smd	542-9003-157
MP 501	Line choke tie-down bracket	017-9700-006
MP506	Transistor ground clip	017-2225-527
PC 001	PC board, 800 MHz PA rev 4	035-5385-500
Q 501	NPN general purpose sw/amp	576-0001-300
Q 502	PNP switching	576-0003-612
Q 503	NPN low noise amp	576-0003-618
Q 504	NPN general purpose SOT-23	576-0003-658
Q 505	NPN general purpose SOT-23	576-0003-658
Q 506	NPN general purpose SOT-23	576-0003-658
Q 507	NPN general purpose SOT-23	576-0003-658
Q 508	PNP low noise amp	576-0003-657
Q 509	NPN 800 MHz 45W amp	576-0004-817
Q 513	PNP pwr Darlington	576-0007-013
Q 515	PNP switching	576-0003-612
Q 516	NPN general purpose SOT-23	576-0003-658
Q 517	NPN general purpose SOT-23	576-0003-658
R 501	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 502	560 ohm $\pm 5\%$ 1/8W smd	569-0105-561
R 503	100 ohm $\pm 5\%$ 3/4W smd	569-0135-101
R 504	100 ohm $\pm 5\%$ 3/4W smd	569-0135-101
R 505	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 506	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 507	68k ohm $\pm 5\%$ 1/8W smd	569-0105-683
R 508	4.7k ohm $\pm 5\%$ 1/8W smd	569-0105-472
R 509	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 510	4.7k ohm $\pm 5\%$ 1/8W smd	569-0105-472
R 511	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 512	220 ohm $\pm 5\%$ 1/8W smd	569-0105-221
R 513	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 514	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 515	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 516	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 517	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 518	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203

## 800 MHz 35W PA Board Assembly

Ref No.	Description	Part No.
R 519	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 520	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 521	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 522	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 523	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 524	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 525	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 526	20k ohm $\pm 5\%$ 1/8W smd	569-0105-203
R 527	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 528	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 529	2.2k ohm $\pm 5\%$ 1/8W smd	569-0105-222
R 530	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 531	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 532	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 534	4.3k ohm $\pm 5\%$ 1/8W smd	569-0105-432
R 535	7.5k ohm $\pm 5\%$ 1/8W smd	569-0105-752
R 536	100k ohm $\pm 1\%$ 1/8W smd	569-0101-501
R 537	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 538	330 ohm $\pm 5\%$ 1/8W smd	569-0105-331
R 539	Zero ohm $\pm 5\%$ 1/8W smd	569-0105-001
R 540	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 541	300 ohm $\pm 5\%$ .425W smd	569-0116-301
R 542	18 ohm $\pm 5\%$ .425W smd	569-0116-180
R 543	300 ohm $\pm 5\%$ .425W smd	569-0116-301
R 544	430 ohm $\pm 5\%$ 1/8W smd	569-0115-431
R 545	10 ohm $\pm 5\%$ 1/8W smd	569-0115-100
R 546	430 ohm $\pm 5\%$ 1/8W smd	569-0115-431
R 547	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 548	5.1k ohm $\pm 5\%$ 1/8W smd	569-0115-512
R 549	1k ohm $\pm 5\%$ 1/8W smd	569-0115-102
R 550	.015 ohm $\pm 5\%$ 2W smd	569-2019-157
R 551	200 ohm $\pm 5\%$ 1/8W smd	569-0115-201
R 552	200 ohm $\pm 5\%$ 1/8W smd	569-0115-201
R 553	6.8k ohm $\pm 5\%$ 1/8W smd	569-0115-682
R 554	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 555	100 ohm $\pm 5\%$ 1/8W smd	569-0115-101
R 556	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 557	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 558	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 559	510 ohm $\pm 5\%$ 1/8W smd	569-0105-511
R 560	510 ohm $\pm 5\%$ 1/8W smd	569-0105-511
R 561	560 ohm $\pm 5\%$ 1/8W smd	569-0105-561
R 562	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104

Ref No.	Description	Part No.
R 563	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 564	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 565	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 569	91k ohm $\pm 5\%$ 1/8W smd	569-0105-913
R 570	220k ohm $\pm 5\%$ 1/8W smd	569-0105-224
R 571	75k ohm $\pm 5\%$ 1/8W smd	569-0105-753
R 572	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 573	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 574	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 575	1.8k ohm $\pm 5\%$ 1/8W smd	569-0105-182
R 576	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 577	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 578	1.8k ohm $\pm 5\%$ 1/8W smd	569-0105-182
R 579	120 ohm $\pm 5\%$ 1/8W smd	569-0105-121
R 580	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 581	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 582	680 ohm $\pm 5\%$ 1/8W smd	569-0105-681
R 583	51 ohm $\pm 5\%$ 1/8W smd	569-0115-510
R 584	3.9k ohm $\pm 5\%$ 1/8W smd	569-0105-392
R 585	51 ohm $\pm 5\%$ 1/8W smd	569-0115-510
R 586	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
R 587	110 ohm $\pm 5\%$ 1/8W smd	569-0105-111
R 588	51 ohm $\pm 5\%$ 1/8W smd	569-0105-510
R 589	110 ohm $\pm 5\%$ 1/8W smd	569-0105-111
R 590	100 ohm $\pm 5\%$ 1/8W smd	569-0105-101
R 591	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 592	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 593	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 595	510 ohm $\pm 5\%$ 1/8W smd	569-0105-511
R 596	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 597	3.9k ohm $\pm 5\%$ 1/8W smd	569-0105-392
R 598	1.2k ohm $\pm 5\%$ 1/8W smd	569-0115-122
R 599	5.1k ohm $\pm 5\%$ 1/8W smd	569-0105-512
R 601	Zero ohm jumper	569-0105-001
R 602	10 ohm $\pm 5\%$ 1W smd	569-0175-100
R 603	10 ohm $\pm 5\%$ 1W smd	569-0175-100
R 604	330 ohm $\pm 5\%$ 1W smd	569-0175-331
R 605	2k ohm $\pm 5\%$ 1W smd	569-0175-202
R 606	100k ohm $\pm 5\%$ 1/4W CC	569-1001-104
R 607	20k ohm $\pm 5\%$ 1/4W CC	569-1001-203
U 501	Shift register, 8-bit MC14094	544-3016-094
U 502	Op amp, low pwr quad LM2902	544-9017-011

## Logic Board Assembly (ARM Version A)

Ref No.	Description	Part No.
U 503	RF switch, DC-2 GHz AS139-73	544-9015-100
U 504	20W 870 MHz power module	544-4001-127
U 505	Current sense amp MAX472ESA	544-2039-002
U 506	Regulator, low drop 3A MIC29303	544-2003-058
Z 501	Filter, 860 MHz 20 MHz 3-pole	532-2007-011

**LOGIC BOARD ASSEMBLY  
(ARM, VER A)**

Part No. 023-5300-421

*(See Section 1.12.2 for more information on this board.)*

C 000	.22 farad 5.5V db1-layer electric	510-9510-055
C 001	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 002	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 003	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 004	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 005	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 006	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 007	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 008	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 009	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 010	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 011	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 012	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 013	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 014	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 015	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 016	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 017	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 018	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 019	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 020	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 021	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 022	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 023	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 024	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 025	15 pF $\pm$ 1 pF NPO 25V cer smd	510-3674-150
C 026	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 027	15 pF $\pm$ 1 pF NPO 25V cer smd	510-3674-150
C 032	.22 $\mu$ F $\pm$ 10% Z5U 25V cer smd	510-3686-224
C 033	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 034	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 035	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 036	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104

Ref No.	Description	Part No.
C 037	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 038	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 039	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 040	330 pF $\pm$ 10% X7R 25V cer smd	510-3675-331
C 041	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 042	.01 $\mu$ F X7R $\pm$ 10% 25V cer smd	510-3675-103
C 043	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 044	1 $\mu$ F +80-20% Z5U 25V cer smd	510-3631-105
C 045	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 046	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 047	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 048	10 pF $\pm$ 1 pF NPO 25V cer smd	510-3673-100
C 049	10 pF $\pm$ 1 pF NPO 25V cer smd	510-3673-100
C 050	68 $\mu$ F $\pm$ 10% 16V tantalum	510-2625-680
C 051	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 052	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 053	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 054	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 055	68 $\mu$ F $\pm$ 10% 16V tantalum	510-2625-680
C 056	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 057	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 058	100 $\mu$ F 10V tantalum smd	510-2624-101
C 059	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 060	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 061	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 062	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 063	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 064	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 065	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 066	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 067	3900 pF $\pm$ 10% X7R 25V cer smd	510-3675-392
C 068	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 069	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 070	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 071	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 072	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 073	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 074	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 075	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 076	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 077	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 078	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 079	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 080	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 081	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104

## Logic Board Assembly (ARM Version A)

Ref No.	Description	Part No.
C 082	.1 $\mu$ F X7R $\pm$ 10% 16V cer smd	510-3606-104
C 083	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 084	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 085	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 086	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 087	100 pF $\pm$ 5% NPO 25V cer smd	510-3674-101
C 088	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 089	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 090	4700 pF 10% X7R 25V cer smd	510-3675-472
C 091	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 092	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 093	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 094	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 095	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 096	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 097	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 098	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 099	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 100	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 101	.1 $\mu$ F X7R $\pm$ 10% 16V cer smd	510-3606-104
C 102	10 $\mu$ F 10V tantalum smd	510-2624-100
C 103	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 104	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 105	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 106	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 107	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 108	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 109	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 110	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 111	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 112	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 113	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 114	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 115	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 116	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 117	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 118	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 119	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 120	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 121	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 122	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 123	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 124	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 125	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 126	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471

Ref No.	Description	Part No.
C 127	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 128	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 129	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 130	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 131	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 132	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 133	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 134	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 135	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 136	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 137	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 138	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 139	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 140	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 141	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 142	10 pF $\pm$ 1 pF NPO 25V cer smd	510-3673-100
C 143	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 144	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 145	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 146	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 147	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 148	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 149	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 150	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 151	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 152	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 153	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 154	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 155	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 156	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 157	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 158	33 pF 10% X7R 25V cer smd	510-3675-330
C 159	33 pF 10% X7R 25V cer smd	510-3675-330
C 160	33 pF 10% X7R 25V cer smd	510-3675-330
C 161	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 162	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 163	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 164	33 pF 10% X7R 25V cer smd	510-3675-330
C 165	33 pF 10% X7R 25V cer smd	510-3675-330
C 166	33 pF 10% X7R 25V cer smd	510-3675-330
C 167	33 pF 10% X7R 25V cer smd	510-3675-330
C 168	33 pF 10% X7R 25V cer smd	510-3675-330
C 169	33 pF 10% X7R 25V cer smd	510-3675-330
C 170	33 pF 10% X7R 25V cer smd	510-3675-330
C 171	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104

## Logic Board Assembly (ARM Version A)

Ref No.	Description	Part No.
C 174	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 175	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 176	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 177	10 $\mu$ F 10V tantalum smd	510-2624-100
C 178	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 179	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 180	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 181	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 182	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 183	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 184	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 185	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 186	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 187	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 188	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 189	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 190	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 191	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 192	10 pF $\pm$ 1 pF NPO 25V cer smd	510-3673-100
C 193	33 pF 10% X7R 25V cer smd	510-3675-330
C 194	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 195	33 pF 10% X7R 25V cer smd	510-3675-330
C 196	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 197	10 pF $\pm$ 1 pF NPO 25V cer smd	510-3673-100
C 199	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 200	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 201	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 202	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
C 203	10 pF $\pm$ 1 pF NPO 25V cer smd	510-3673-100
C 204	.1 $\mu$ F X7R $\pm$ 10% 16V cer smd	510-3606-104
C 205	10 $\mu$ F 10V tantalum smd	510-2624-100
C 207	.1 $\mu$ F +80-20% Z5U 25V cer smd	510-3680-104
D 002	5.6V zener	523-2016-569
D 003	Dual switch-com cathode	523-1504-022
D 005	Diode, Schottky rect	523-0519-034
D 006	Dual switch-com cath	523-1504-022
D 007	Dual switch-com cath	523-1504-022
D 008	18V zener	523-2601-180
D 009	Dual switch-com cath	523-1504-022
D 011	5.1V zener	523-2601-519
D 012	Dual switch-com cath	523-1504-022
D 015	Switching diode	523-1004-021
F 001	Fuse, 0.5A smd	534-5002-009

Ref No.	Description	Part No.
J 001	Connector, 16-pin	515-7000-668
J 002	Connector, 25-pin	515-7113-071
J 003	Connector, 25-pin	515-7113-071
J 004	Connector, 25-pin	515-7113-071
J 005	Connector, 13-pin	515-7111-262
J 006	Connector, 13-pin	515-7111-262
J 007	Connector, 5-pin	515-7111-254
J 008	Connector, 12-pin	515-7111-261
J 009	Connector, 2 x 14 pin	515-9500-045
J 010	Connector, 25-pin	515-7113-071
J 011	Connector, 5-pin	515-7111-254
L 002	1.8 $\mu$ H 350 ma smd	542-9230-027
L 003	33 $\mu$ H 1.2A smd	542-9230-025
L 004	Ferrite bead smd	542-9230-005
L 005	Ferrite inductor	542-9230-021
L 006	Ferrite bead smd	542-9230-005
L 008	Ferrite inductor	542-9230-021
L 009	Ferrite inductor	542-9230-021
L 011	Ferrite inductor	542-9230-021
L 012	Ferrite inductor	542-9230-021
L 014	Ferrite inductor	542-9230-021
L 015	Ferrite inductor	542-9230-021
L 016	Ferrite inductor	542-9230-021
L 017	Ferrite inductor	542-9230-021
L 018	Ferrite inductor	542-9230-021
L 019	Ferrite inductor	542-9230-021
L 020	Ferrite inductor	542-9230-021
L 021	Ferrite inductor	542-9230-021
PC 410	PC board, P25 trunking logic Rev 8	035-1800-410 8
Q 001	NPN general purpose	576-0003-658
Q 002	NPN switching	576-0003-714
Q 003	NPN general purpose	576-0003-658
Q 004	NPN general purpose	576-0003-658
Q 005	NPN general purpose	576-0003-658
Q 006	Transistor	576-0003-725
Q 007	NPN general purpose	576-0003-658
Q 008	NPN general purpose	576-0003-658
Q 009	NPN general purpose	576-0003-658
Q 010	NPN general purpose	576-0003-658
Q 011	NPN general purpose	576-0003-658
Q 012	NPN general purpose	576-0003-658

## Logic Board Assembly (ARM Version A)

Ref No.	Description	Part No.
Q 013	NPN general purpose	576-0003-658
Q 014	NPN general purpose	576-0003-658
Q 015	NPN general purpose	576-0003-658
Q 016	NPN general purpose	576-0003-658
Q 017	NPN general purpose	576-0003-658
Q 018	NPN general purpose	576-0003-658
Q 019	NPN general purpose	576-0003-658
Q 020	NPN general purpose	576-0003-658
Q 021	NPN general purpose	576-0003-658
Q 022	NPN general purpose	576-0003-658
Q 023	NPN general purpose	576-0003-658
Q 024	Deleted	
Q 025	NPN general purpose	576-0003-658
Q 026	NPN general purpose	576-0003-658
Q 027	NPN general purpose	576-0003-658
Q 028	NPN general purpose	576-0003-658
Q 029	NPN general purpose	576-0003-658
R 001	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 002	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 003	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 004	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 005	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 006	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 007	390k ohm $\pm 5\%$ 1/16W smd	569-0155-394
R 008	0 ohm jumper	569-0155-001
R 009	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 011	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 012	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 013	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 014	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 015	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 016	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 017	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 018	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 019	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 020	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 021	1.0M ohm $\pm 5\%$ 1/16W smd	569-0155-105
R 024	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 025	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 026	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 027	510k ohm $\pm 5\%$ 1/16W smd	569-0155-514
R 028	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 029	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 030	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103

Ref No.	Description	Part No.
R 031	10 ohm $\pm 5\%$ 1/16W smd	569-0155-100
R 032	10 ohm $\pm 5\%$ 1/16W smd	569-0155-100
R 033	0 ohm jumper	569-0155-001
R 034	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 035	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 036	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 037	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 038	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 039	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 040	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 041	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 042	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 043	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 044	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 045	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 046	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 047	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 048	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 049	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 050	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 051	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 052	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 053	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 054	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 055	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 056	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 057	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 058	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 059	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 060	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 061	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 062	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 063	22k ohm $\pm 5\%$ 1/16W smd	569-0155-223
R 064	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 065	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 066	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 067	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 068	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 069	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 070	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 071	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 072	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 073	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 075	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 077	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473

## Logic Board Assembly (ARM Version A)

Ref No.	Description	Part No.
R 078	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 079	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 080	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 081	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 082	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 083	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 084	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 085	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 086	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 087	0 ohm jumper	569-0155-001
R 088	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 089	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 090	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 091	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 092	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 093	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 094	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 095	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 096	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 097	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 098	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 099	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 100	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 101	390k ohm $\pm 5\%$ 1/16W smd	569-0155-394
R 102	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 103	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 104	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 105	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 106	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 107	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 108	6.8k ohm $\pm 5\%$ 1/8W smd	569-0105-682
R 109	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 110	150 ohm $\pm 5\%$ 1/16W smd	569-0155-151
R 111	150 ohm $\pm 5\%$ 1/16W smd	569-0155-151
R 112	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 113	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 114	10 ohm $\pm 5\%$ 1/16W smd	569-0155-100
R 115	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 116	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 117	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 118	180k ohm $\pm 5\%$ 1/16W smd	569-0155-184
R 119	68k ohm $\pm 5\%$ 1/16W smd	569-0155-683
R 120	2.2M ohm $\pm 5\%$ 1/16W smd	569-0155-225
R 121	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 122	56k ohm $\pm 5\%$ 1/16W smd	569-0155-563

Ref No.	Description	Part No.
R 123	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 124	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 125	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 126	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 127	68k ohm $\pm 5\%$ 1/16W smd	569-0155-683
R 128	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 129	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 131	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 132	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 133	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 134	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 135	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 136	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 137	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 138	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 139	Deleted	
R 140	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 141	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 142	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 143	10 ohm $\pm 5\%$ 1/16W smd	569-0155-100
R 144	10 ohm $\pm 5\%$ 1/16W smd	569-0155-100
R 146	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 147	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 148	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 149	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 150	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 151	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 152	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 153	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 154	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 155	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 156	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 157	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 158	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 161	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 162	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 163	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 164	33.2k ohm $\pm 1\%$ 0.1W smd	569-0151-451
R 165	Deleted	
R 166	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 167	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 168	0 ohm jumper	569-0155-001
R 170	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 171	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 172	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103



## Logic Board Assembly (ARM Version A)

Ref No.	Description	Part No.
R 173	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 174	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 175	Deleted	
R 176	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 177	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 178	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 179	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 180	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 181	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 182	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 183	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 184	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 185	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 186	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 187	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 188	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 189	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 190	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 191	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 192	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 194	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 195	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 196	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 197	270k ohm $\pm 5\%$ 1/16W smd	569-0155-274
R 198	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 199	0 ohm jumper	569-0155-001
R 200	0 ohm jumper	569-0155-001
R 201	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 202	0 ohm jumper	569-0155-001
R 203	0 ohm jumper	569-0155-001
R 204	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 205	0 ohm jumper	569-0155-001
R 206	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 207	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 208	1.0M ohm $\pm 5\%$ 1/16W smd	569-0155-105
R 209	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 210	0 ohm jumper	569-0155-001
R 213	0 ohm jumper	569-0155-001
R 216	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 217	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 218	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 219	0 ohm jumper	569-0155-001
R 220	0 ohm jumper	569-0155-001
R 221	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 222	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104

Ref No.	Description	Part No.
R 223	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 224	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 226	0 ohm jumper	569-0155-001
R 227	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 228	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 250	0 ohm jumper	569-0155-001
R 255	27k ohm $\pm 5\%$ 1/16W smd	569-0155-273
S 001	Switch detector mom NO	583-9512-002
U 001	Programmable logic	023-9998-492
U 002	Flash 5V 4M 256K x 16 AT49F4096A-90TI	544-5001-356
U 003	Regulator, lo-drop TPS7333QD	544-1020-009
U 004	NAND, 2 input TC7SH00FU	544-1010-012
U 005	DSP RAM 64 x 16 CY7C1021B-15ZI	544-5003-360
U 006	Microcontroller, ARM AT91F40816-4CI	544-5001-363
U 007	RS232 driver LTC1338IG	544-1015-706
U 008	SRAM 256 x 16 CY62146V7UZI	544-5001-127
U 009	D- flip flop HC574	544-3766-574
U 010	D- flip flop HC574	544-3766-574
U 011	DC/DC conv 5V MAX744AEWE	544-1010-744
U 012	DSP TMS320C50PGEA	544-1010-018
U 013	Regulator 5V LT1121IST-5	544-1011-121
U 014	RS485 driver SN65176	544-2023-027
U 015	Op-amp quad 324	544-1020-324
U 016	Multiplexer triple 4053	544-1014-053
U 017	Op amp, dual 358	544-1020-385
U 018	Op amp, dual 358	544-1020-385
U 019	Op amp, dual 358	544-1020-385
U 020	UART, dual SCC2692	544-1010-038
U 021	A/D conv 8-bit serial TLC548I	544-1010-548
U 022	Multiplexer triple 4053	544-1014-053
U 023	D- flip flop HC574	544-3766-574
U 024	D- flip flop HC574	544-3766-574
U 025	EEPROM 32k x 8 AT24C256W-10SI	544-1020-256
U 026	Bus xcvr octal SN74LVCC3245	544-1010-248
U 027	Bus xcvr octal SN74LVCC3245	544-1010-248
U 028	Bus xcvr octal SN74LVCC3245	544-1010-248
U 030	ADSIC	544-9100-002
U 031	Bus xcvr octal SN74LVCC3245	544-1010-248
U 032	Multiplexer triple 4053	544-1014-053
U 033	Op amp, dual 358	544-1020-385

## Logic Board Assembly (PPC Version B)

Ref No.	Description	Part No.
Y 001	Crystal 20.0000 MHz	521-3060-037
Y 002	Crystal 3.6864 MHz smd	521-3060-053
Y 003	Crystal osc, prog 35.0208 MHz SG-8002JC	521-9001-350
<b>LOGIC BOARD ASSEMBLY (VER B)</b> SEM Version Part No. 023-5300-611 UCM Version Part No. 023-5300-621		
<i>(See Section 1.12.2 for more information on these boards.)</i>		
A 001	SEM encryption module BGA (-611 SEM board only)	023-5000-980
	UCM encrpt module NNTN4433A (-621 UCM board only)	585-5000-924
A 699	UCM jack termination plug (-611 SEM board only)	023-5300-699
C 001	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 002	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 003	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 004	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 005	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 006	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 007	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 008	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 009	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 010	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 011	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 012	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 013	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 014	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 015	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 016	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 017	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 018	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 019	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 020	.22 $\mu\text{F}$ 16V cer smd	510-3680-224
C 021	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 022	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 023	470 pF $\pm 10\%$ 25V cer smd	510-3681-471
C 024	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 025	5.1 pF $\pm 1$ pF NPO cer smd	510-3673-519
C 026	6.2 pF $\pm 1$ pF NPO cer smd	510-3673-629
C 027	10 pF $\pm 1$ pF NPO cer smd	510-3673-100

Ref No.	Description	Part No.
C 028	470 pF $\pm 10\%$ 25V cer smd	510-3681-471
C 029	5.6 $\pm 10\%$ 25V cer smd	510-3681-569
C 030	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 031	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 032	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 033	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 034	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 035	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 036	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 037	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 038	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 039	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 040	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 041	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 042	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 043	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 044	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 045	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 046	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 047	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 048	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 049	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 050	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 051	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 052	33 pF $\pm 10\%$ 25V cer smd	510-3681-330
C 053	33 pF $\pm 10\%$ 25V cer smd	510-3681-330
C 054	33 pF $\pm 10\%$ 25V cer smd	510-3681-330
C 055	33 pF $\pm 10\%$ 25V cer smd	510-3681-330
C 056	33 pF $\pm 10\%$ 25V cer smd	510-3681-330
C 057	33 pF $\pm 10\%$ 25V cer smd	510-3681-330
C 058	33 pF $\pm 10\%$ 25V cer smd	510-3681-330
C 064	.1 $\mu\text{F} \pm 80\text{-}20\%$ Z5U 25V cer smd	510-3680-104
C 065	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 066	2.2 $\mu\text{F}$ 16V ceramic smd	510-3925-225
C 069	.1 $\mu\text{F} \pm 80\text{-}20\%$ Z5U 25V cer smd	510-3680-104
C 070	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 071	2.2 $\mu\text{F}$ 16V ceramic smd	510-3925-225
C 078	2.2 $\mu\text{F}$ 16V ceramic smd	510-3925-225
C 079	1 $\mu\text{F} \pm 80\text{-}20\%$ Z5U 25V cer smd	510-3631-105
C 080	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 081	1.5 F electrolytic	510-9510-057
C 094	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 125	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 126	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 127	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103

## Logic Board Assembly (PPC Version B)

Ref No.	Description	Part No.
C 128	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 129	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 130	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 131	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 183	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 184	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 185	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 186	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 187	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 188	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 189	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 190	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 191	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 192	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 196	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 197	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 198	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 199	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 200	.01 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-103
C 201	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 202	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 203	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 204	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 205	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 206	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 207	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 208	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 209	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 210	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 211	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 212	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 213	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 214	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 215	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 216	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 217	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 218	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 219	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 220	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 221	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 222	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 223	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 224	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 225	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 226	10 $\mu$ F 10V cer smd	510-3755-106

Ref No.	Description	Part No.
C 227	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 228	3300 pF $\pm$ 10% 10V cer smd	510-3681-332
C 229	56 pF $\pm$ 5% 50V cer smd	510-3684-560
C 230	47 pF $\pm$ 10% cer smd	510-3681-470
C 231	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 232	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 233	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 234	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 235	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 236	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 237	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 238	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 239	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 240	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 241	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 242	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 243	100 pF $\pm$ 5% NPO 25V cer smd	510-3674-101
C 245	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 246	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 247	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 248	4700 pF 10% X7R 25V cer smd	510-3675-472
C 249	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 250	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 251	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 252	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 253	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 254	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 255	10 $\mu$ F 10V tantalum smd	510-2624-100
C 257	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 258	10 $\mu$ F 10V tantalum smd	510-2624-100
C 261	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 262	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 263	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 263	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 264	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 265	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 266	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 267	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 268	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 269	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 270	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 271	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 272	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 273	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 274	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471

## Logic Board Assembly (PPC Version B)

Ref No.	Description	Part No.
C 275	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 276	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 277	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 278	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 279	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 281	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 282	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 283	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 284	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 285	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 286	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 287	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 288	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 289	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 290	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 291	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 292	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 293	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 294	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 295	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 296	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 299	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 300	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 301	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 302	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 303	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 304	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 305	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 306	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 307	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 309	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 312	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 313	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 314	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 315	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 316	10 $\mu$ F 10V cer smd	510-3755-106
C 317	8.2pF $\pm .1$ pF NPO cer smd	510-3673-829
C 318	10 $\mu$ F 10V cer smd	510-3755-106
C 319	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 320	10 $\mu$ F 10V cer smd	510-3755-106
C 321	10 pF $\pm .1$ pF NPO cer smd	510-3673-100
C 322	10 pF $\pm .1$ pF NPO cer smd	510-3673-100
C 323	10 $\mu$ F 10V cer smd	510-3755-106
C 324	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 325	4.7 $\mu$ F 20V tantalum smd	510-2626-479

Ref No.	Description	Part No.
C 326	.001 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-102
C 327	.001 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-102
C 328	.001 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-102
C 345	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
CR 001	Switching diode	523-1004-021
CR 002	Switching diode	523-1004-021
CR 004	Zener diode 5.6V	523-2016-569
CR 005	Zener diode 18V	523-2601-180
CR 006	Zener diode 5.1V	523-2601-519
CR 010	Zener diode 3.6V	523-2016-369
CR 011	Zener diode 3.6V	523-2016-369
CR 012	Switching diode	523-1004-021
D 001	Diode, Pin Switching	523-1504-001
D 002	Dual switch-com cathode	523-1504-022
D 003	Dual switch-com cathode	523-1504-022
D 004	Dual switch-com cathode	523-1504-022
D 005	Dual switch-com cathode	523-1504-022
D 006	Dual switch-com cathode	523-1504-022
F 001	Fuse, 0.5A smd	534-5002-009
J 001	Connector, 16-pin	515-7000-668
J 002	Connector, 25-pin	515-7113-071
J 005	Connector, 13-pin	515-7111-262
J 006	Connector, 13-pin	515-7111-262
J 007	Connector, 5-pin	515-7111-254
J 008	Connector, 12-pin	515-7111-261
J 009	Connector, 2 x 14 pin	515-9500-045
J 011	Connector, 5-pin	515-7111-254
J 012	Connector, 13-pin	515-7111-262
J 016	Connector, 25-pin UCM (-621 UCM board only)	515-7113-071
J 017	Connector, 25-pin	515-7113-071
J 018	Connector, 25-pin	515-7113-071
L 001	1.8 $\mu$ H smd inductor	542-9017-189
L 007	270 nH smd inductor	542-9017-274
L 008	270 nH smd inductor	542-9017-274
L 010	270 nH smd inductor	542-9017-274
L 011	270 nH smd inductor	542-9017-274
L 015 - L 053	Ferrite inductor	542-9230-023
L 054	8.2 $\mu$ H smd inductor	542-9000-829

## Logic Board Assembly (PPC Version B)

Ref No.	Description	Part No.
L 055	Ferrite bead	542-9230-005
L 056	Ferrite bead	542-9230-005
L 057 - L 065	Ferrite inductor	542-9230-021
PC 001	SEM/UCM logic PC board (Rev 5)	035-5300-6005
Q 005	Transistor	576-0003-725
Q 006	NPN general purpose	576-0003-658
Q 009	NPN general purpose	576-0003-658
Q 010	NPN general purpose	576-0003-658
Q 011	NPN general purpose	576-0003-658
Q 012	NPN general purpose	576-0003-658
Q 013	NPN general purpose	576-0003-658
Q 014	NPN general purpose	576-0003-658
Q 015	NPN general purpose	576-0003-658
Q 016	NPN general purpose	576-0003-658
Q 017	NPN general purpose	576-0003-658
Q 018	NPN general purpose	576-0003-658
Q 019	NPN general purpose	576-0003-658
Q 020	NPN general purpose	576-0003-658
Q 021	NPN general purpose	576-0003-658
Q 022	NPN general purpose	576-0003-658
Q 023	NPN general purpose	576-0003-658
Q 024	NPN general purpose	576-0003-658
Q 025	NPN general purpose	576-0003-658
Q 026	NPN general purpose	576-0003-658
Q 027	NPN general purpose	576-0003-658
Q 028	NPN general purpose	576-0003-658
Q 029	NPN general purpose	576-0003-658
R 001	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 002	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 003	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 004	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 005	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 006	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 007	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 008	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 009	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 010	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 011	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 012	6.8k ohm $\pm 5\%$ 1/16W smd	569-0165-682
R 013	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 014	390k ohm $\pm 5\%$ 1/16W smd	569-0165-394

Ref No.	Description	Part No.
R 015	0 ohm jumper	569-0165-001
R 016	1M ohm $\pm 5\%$ 1/16W smd	569-0165-105
R 017	15k ohm $\pm 5\%$ 1/16W smd	569-0165-153
R 018	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 019	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 020	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 021	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 022	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 023	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 025	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 027	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 029	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 031	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 033	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 035	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 037	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 039	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 041	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 043	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 045	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 047	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 049	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 050	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 051	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 076	100 ohm $\pm 5\%$ 1/16W smd	569-0165-101
R 078	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 080	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 082	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 083	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 084	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 085	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 086	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 095	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 098	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 099	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 101	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 102	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 103	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 104	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 105	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 106	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 107	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 108	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 109	2k ohm $\pm 5\%$ 1/16W smd	569-0165-202
R 110	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472

## Logic Board Assembly (PPC Version B)

Ref No.	Description	Part No.
R 111	2k ohm $\pm 5\%$ 1/16W smd	569-0165-202
R 112	2k ohm $\pm 5\%$ 1/16W smd	569-0165-202
R 113	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 114	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 115	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 118	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 119	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 120	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 121	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 122	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 125	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 126	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 127	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 128	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 129	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 130	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 131	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 132	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 141	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 224	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 225	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 226	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 249	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 251	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 252	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 253	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 255	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 256	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 257	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 258	2k ohm $\pm 5\%$ 1/16W smd	569-0155-202
R 259	10M ohm $\pm 5\%$ 1/16W smd	569-0165-106
R 260	2k ohm $\pm 5\%$ 1/16W smd	569-0155-202
R 261	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 262	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 263	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 264	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 265	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 266	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 267	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 268	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 269	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 270	62k ohm $\pm 5\%$ 1/16W smd	569-0155-623
R 271	150k ohm $\pm 5\%$ 1/16W smd	569-0155-154
R 272	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682

Ref No.	Description	Part No.
R 273	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 274	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 275	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 276	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 277	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 278	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 279	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 280	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 281	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 282	0 ohm jumper	569-0155-001
R 283	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 284	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 285	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 286	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 287	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 288	56k ohm $\pm 5\%$ 1/16W smd	569-0155-563
R 289	390k ohm $\pm 5\%$ 1/16W smd	569-0155-394
R 290	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 291	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 292	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 293	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 294	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 295	150 ohm $\pm 5\%$ 1/16W smd	569-0155-151
R 296	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 297	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 298	150 ohm $\pm 5\%$ 1/16W smd	569-0155-151
R 299	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 300	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 301	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 302	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 303	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 304	68k ohm $\pm 5\%$ 1/16W smd	569-0165-683
R 305	0 ohm jumper	569-0155-001
R 307	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 308	0 ohm jumper	569-0155-001
R 309	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 310	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 311	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 312	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 313	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 315	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 316	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 318	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 319	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 320	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103

## Logic Board Assembly (PPC Version B)

Ref No.	Description	Part No.
R 321	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 322	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 323	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 324	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 325	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 326	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 327	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 328	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 329	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 330	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 331	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 332	470 ohm $\pm 5\%$ 1/16W smd	569-0155-471
R 333	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 334	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 336	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 338	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 339	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 340	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 341	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 342	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 344	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 345	470 ohm $\pm 5\%$ 1/16W smd	569-0155-471
R 346	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 348	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 349	470 ohm $\pm 5\%$ 1/16W smd	569-0155-471
R 350	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 351	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 353	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 355	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 356	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 357	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 358	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 360	10 ohm $\pm 5\%$ 1/16W smd	569-0155-100
R 361	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 362	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 364	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 365	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 366	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 367	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 368	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 369	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 370	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 371	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 372	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 373	33.2k ohm $\pm 1\%$ 0.1W cer smd	569-0151-451

Ref No.	Description	Part No.
R 374	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 377	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 378	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 379	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 392	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 393	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 394	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 395	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 396	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 399	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 400	665k ohm $\pm 1\%$ 0.1W cer smd	569-0151-580
R 401	100k ohm $\pm 1\%$ 0.1W cer smd	569-0151-501
R 402	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 403	255k ohm $\pm 1\%$ 0.1W cer smd	569-0151-551
R 404	100k ohm $\pm 1\%$ 0.1W cer smd	569-0151-501
R 405	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 406	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 407	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 408	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 409	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 410	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 411	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 412	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 413	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 683	68k ohm $\pm 5\%$ 1/16W smd	569-0155-683
R 685	27k ohm $\pm 5\%$ 1/16W smd	569-0155-273
S 001	Switch,detector,mom NO,smt Bulk	583-9512-002
U 001	DSP TI TMS320VC5416	544-5003-129
U 002	ADSIC	544-9100-002
U 005	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 006	3-state buffer 74ACT16244	544-3776-119
U 007	Programmable logic	544-1015-066
U 011	Regulator, 5V 400 mA REG113EA	544-2603-055
U 013	Regulator, 5V 400 mA REG113EA	544-2603-055
U 015	Regulator, 3.8V, 50 mA LP2982	544-5001-335
U 016	Analog switch, SPDT NLAS4599	544-4002-007
U 017	Analog switch, SPDT NLAS4599	544-4002-007
U 018	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 020	SRAM 256k x 16 CY62146V	544-5001-213
U 021	Flash 8M x 8 bit/64MB 63FBGA	544-5001-255
U 023	SRAM 512k x 16 CY62157CV30)	544-5001-215
U 024	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 025	Buffer, quad 74LCX125	544-3776-127

## Logic Board Assembly (PPC Version C)

Ref No.	Description	Part No.
U 026	3-state buffer, quad 74ACT125	544-3776-117
U 027	Schmitt trig, inv TC7S14F-TE85L	544-3123-014
U 042	Triple supply monitor LT1727	544-5001-341
U 045	RS-232 bus xcvr MAX3221EAE	544-2023-036
U 046	RS-485 bus transceiver ADM483	544-2023-073
U 048	Bus xcvr, octal 74LVCC3245	544-1010-250
U 049	Op am, quad MC3303	544-2020-008
U 056	Multiplexer triple 4053	544-1014-053
U 057	Microcontroller PowerPC MPC850	544-5003-127
U 058	EEPROM 32k x 8 M24256	544-1019-376
U 059	Multiplexer triple 4053	544-1014-053
U 060	Op am, quad MC3303	544-2020-008
U 061	Op am, quad MC3303	544-2020-008
U 063	Flip flop octal 74HC574	544-3764-576
U 064	Flip flop octal 74HC574	544-3764-576
U 065	Flip flop octal 74HC574	544-3764-576
U 066	Multiplexer triple 4053	544-1014-053
U 067	Converter, A/D 8-bit ser TLC5481	544-1010-548
U 069	RS-232 bus xcvr MAX3221EAE	544-2023-036
U 070	Analog switch, SPDT NLAS4599	544-4002-007
U 071	SRAM 512k x 16 CY62157CV30	544-5001-215
U 072	SRAM 512k x 16 CY62157CV30	544-5001-215
U 073	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 074	DC-DC converter TPS6200	544-4006-011
U 075	DC-DC converter TPS6200	544-4006-011
U 076	Bus xcvr, octal 74LVCC3245	544-1010-250
U 077	Bus xcvr, octal 74LVCC3245	544-1010-250
U 078	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 079	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 080	Regulator 5V LT1121IST-5	544-1011-121
U 081	Buffer, quad 74LCX125	544-3776-127
U 082	Programmable logic (-621 UCM board only)	544-5001-419
Y 001	20.000 MHz crystal	521-0020-001
Y 002	4.9152 MHz crystal	521-3060-022
<b>LOGIC BOARD ASSEMBLY (VER C)</b> Part No. 023-5500-600		
A 001	SEM encryption module	023-5000-980
C 001	.01 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-103
C 013	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104

Ref No.	Description	Part No.
C 014	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 052	33 pF $\pm 10\%$ 10V cer smd	510-3681-330
C 053	33 pF $\pm 10\%$ 10V cer smd	510-3681-330
C 054	33 pF $\pm 10\%$ 10V cer smd	510-3681-330
C 055	33 pF $\pm 10\%$ 10V cer smd	510-3681-330
C 056	33 pF $\pm 10\%$ 10V cer smd	510-3681-330
C 057	33 pF $\pm 10\%$ 10V cer smd	510-3681-330
C 058	0.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 064	0.1 $\mu\text{F} + 80\text{-}20\%$ Z5U 25V cer smd	510-3680-104
C 065	0.01 $\pm 10\%$ 10V cer smd	510-3681-103
C 066	2.2 $\mu\text{F}$ 16V ceramic smd	510-3925-225
C 069	0.1 $\mu\text{F} + 80\text{-}20\%$ Z5U 25V cer smd	510-3680-104
C 070	0.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 071	2.2 $\mu\text{F}$ 16V ceramic smd	510-3925-225
C 078	2.2 $\mu\text{F}$ 16V ceramic smd	510-3925-225
C 079	1 $\mu\text{F} + 80\text{-}20\%$ Z5U 25V cer smd	510-3631-105
C 080	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 081	1.5F electrolytic	510-9510-057
C 125	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 126	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 127	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 128	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 129	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 130	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 131	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 183	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 184	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 185	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 186	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 190	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 191	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 192	.01 $\mu\text{F} \pm 10\%$ 10V cer smd	510-3681-103
C 196	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 197	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 198	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 199	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 200	.01 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-103
C 201	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 202	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 203	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 204	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 205	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 206	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 207	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104
C 208	.1 $\mu\text{F} \pm 10\%$ X7R 25V cer smd	510-3675-104



## Logic Board Assembly (PPC Version C)

Ref No.	Description	Part No.
C 209	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 210	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 211	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 212	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 213	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 214	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 215	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 216	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 217	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 218	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 219	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 220	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 221	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 222	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 223	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 224	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 225	.01 $\mu$ F $\pm$ 10% 10V cer smd	510-3681-103
C 226	10 $\mu$ F 10V cer smd	510-3755-106
C 227	.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 228	3300 pF $\pm$ 10% 10V cer smd	510-3681-332
C 229	56 pF $\pm$ 5% 50V cer smd	510-3684-560
C 230	47 pF $\pm$ 10% cer smd	510-3681-470
C 231	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 232	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 233	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 234	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 235	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 236	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 237	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 238	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 239	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 240	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 241	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 242	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 243	100 pF $\pm$ 5% NPO 25V cer smd	510-3674-101
C 245	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 246	1 $\mu$ F $\pm$ 20% Z5U 25V cer smd	510-3636-105
C 247	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 248	4700 pF 10% X7R 25V cer smd	510-3675-472
C 249	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 250	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 251	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 252	220 pF $\pm$ 5% NPO 25V cer smd	510-3674-221
C 253	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 254	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104

Ref No.	Description	Part No.
C 255	10 $\mu$ F 10V tantalum smd	510-2624-100
C 257	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 258	10 $\mu$ F 10V tantalum smd	510-2624-100
C 261	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 262	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 263	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 264	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 265	.1 $\mu$ F $\pm$ 80-20% Z5U 25V cer smd	510-3680-104
C 266	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 267	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 268	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 269	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 270	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 271	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 272	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 273	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 274	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 275	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 276	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 277	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 278	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 279	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 281	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 282	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 283	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 284	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 285	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 286	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 287	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 288	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 289	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 290	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 291	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 292	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 293	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 294	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 295	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 296	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 299	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 302	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 303	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 304	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 305	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 306	470 pF $\pm$ 5% NPO 25V cer smd	510-3674-471
C 308	0.01 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-103

## Logic Board Assembly (PPC Version C)

Ref No.	Description	Part No.
C 309	470 pF $\pm 5\%$ NPO 25V cer smd	510-3674-471
C 312	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 313	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 314	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 315	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 316	10 $\mu$ F 10V cer smd	510-3755-106
C 317	8.2pF $\pm .1$ pF NPO cer smd	510-3673-829
C 318	22 $\mu$ F $\pm 10\%$ 16V X5R smd	510-3607-226
C 319	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 320	10 $\mu$ F 10V cer smd	510-3755-106
C 321	10 pF $\pm .1$ pF NPO cer smd	510-3673-100
C 322	10 pF $\pm .1$ pF NPO cer smd	510-3673-100
C 323	22 $\mu$ F $\pm 10\%$ 16V X5R smd	510-3607-226
C 324	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 325	4.7 $\mu$ F 20V tantalum smd	510-2626-479
C 326	0.01 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-103
C 327	0.01 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-103
C 328	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C 329	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C330	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C331	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C332	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C333	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C334	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C335	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C336	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C337	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C338	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C339	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 340	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 341	100 pF $\pm 10\%$ 25V cer smd	510-3681-101
C 342	100 pF $\pm 10\%$ 25V cer smd	510-3681-101
C 343	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C 344	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C 345	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C 346	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C 347	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C 348	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C 349	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 350	.01 $\mu$ F $\pm 10\%$ 10V cer smd	510-3681-103
C 351	2.2 $\mu$ F 16V cer smd	510-3925-225
C 352	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 353	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 354	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 355	.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104

Ref No.	Description	Part No.
CR 001	Silicon switching diode	523-1004-021
CR 002	Silicon switching diode	523-1004-021
CR 003	Silicon switching diode	523-1004-021
CR 004	Zener diode, 5.6V	523-2016-569
CR 005	Zener diode, 18V	523-2601-180
CR 006	Zener diode, 5.1V	523-2601-519
CR 010	Zener diode, 3.6V	523-2016-369
CR 011	Zener diode, 3.6V	523-2016-369
CR 012	Silicon switching diode	523-1004-021
CR 013	LED, green	549-4003-011
CR 014	LED, green	549-4003-011
CR 015	LED, green	549-4003-011
D 002	Dual switching diode, com cath	523-1504-022
D 003	Dual switching diode, com cath	523-1504-022
D 004	Dual switching diode, com cath	523-1504-022
D 005	Dual switching diode, com cath	523-1504-022
D 006	Dual switching diode, com cath	523-1504-022
F 001	Fuse, 0.5A smd	534-5002-009
J 001	Connector, 16-pin	515-7000-668
J 002	Connector, 25-pin	515-7113-071
J 005	Connector, 13-pin	515-7111-262
J 006	Connector, 13-pin	515-7111-262
J 007	Connector, 5-pin	515-7111-254
J 008	Connector, 12-pin	515-7111-261
J 009	Connector, 2 14-pin	515-9500-045
J 011	Connector, 5-pin	515-7111-254
J 012	Connector, 13-pin	515-7111-262
J 016	Connector, 25-pin	515-7113-071
J 018	Connector, 25-pin	515-7113-071
L 015 - L 053	Inductor, ferrite smd	542-9230-023
L 054	8.2 $\mu$ H $\pm 5\%$ smd	542-9000-829
L 055	Bead, ferrite smd	542-9230-005
L 056	Bead, ferrite smd	542-9230-005
L 057	Inductor, ferrite smd	542-9230-021
L 058	Inductor, ferrite smd	542-9230-021
L 059	Inductor, ferrite smd	542-9230-021
L 060	Inductor, ferrite smd	542-9230-021
L 061	Inductor, ferrite smd	542-9230-021
L 062	Inductor, ferrite smd	542-9230-021

## Logic Board Assembly (PPC Version C)

Ref No.	Description	Part No.
L 063	Bead, ferrite smd	542-9230-005
L 064	10 $\mu$ H power inductor	542-9009-100
L 065	10 $\mu$ H power inductor	542-9009-100
PC 001	PC board, 5500 logic rev 1	035-5500-600 1
Q 005	N-chan MOSFET 60V 1A	576-0003-725
Q 006	NPN general purpose	576-0003-658
Q 009	NPN general purpose	576-0003-658
Q 010	NPN general purpose	576-0003-658
Q 011	NPN general purpose	576-0003-658
Q 012	NPN general purpose	576-0003-658
Q 013	NPN general purpose	576-0003-658
Q 014	NPN general purpose	576-0003-658
Q 015	NPN general purpose	576-0003-658
Q 017	NPN general purpose	576-0003-658
Q 018	NPN general purpose	576-0003-658
Q 020	NPN general purpose	576-0003-658
Q 021	NPN general purpose	576-0003-658
Q 022	NPN general purpose	576-0003-658
Q 023	NPN general purpose	576-0003-658
Q 024	NPN general purpose	576-0003-658
Q 025	NPN general purpose	576-0003-658
Q 026	NPN general purpose	576-0003-658
Q 027	NPN general purpose	576-0003-658
Q 028	NPN general purpose	576-0003-658
Q 029	NPN general purpose	576-0003-658
R 001	10k ohm $\pm$ 5% 1/16W smd	569-0165-103
R 002	51k ohm $\pm$ 5% 1/16W smd	569-0165-513
R 003	51k ohm $\pm$ 5% 1/16W smd	569-0165-513
R 004	51k ohm $\pm$ 5% 1/16W smd	569-0165-513
R 006	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 007	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 008	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 009	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 010	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 011	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 012	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 013	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 014	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 015	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 016	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 017	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 018	100k ohm $\pm$ 5% 1/16W smd	569-0165-104

Ref No.	Description	Part No.
R 019	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 020	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 021	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 022	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 023	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 024	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 025	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 029	51k ohm $\pm$ 5% 1/16W smd	569-0165-513
R 030	51k ohm $\pm$ 5% 1/16W smd	569-0165-513
R 031	51k ohm $\pm$ 5% 1/16W smd	569-0165-513
R 038	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 039	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 040	620 ohm $\pm$ 5% smd	569-0105-621
R 041	620 ohm $\pm$ 5% smd	569-0105-621
R 076	100 ohm $\pm$ 5% 1/16W smd	569-0165-101
R 078	10 ohm $\pm$ 5% 1/16W smd	569-0165-100
R 080	1k ohm $\pm$ 5% 1/16W smd	569-0155-102
R 095	220k ohm $\pm$ 5% 1/16W smd	569-0155-224
R 098	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 099	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 101	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 102	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 103	100k ohm $\pm$ 5% 1/16W smd	569-0165-104
R 104	100k ohm $\pm$ 5% 1/16W smd	569-0165-104
R 105	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 106	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 107	1k ohm $\pm$ 5% 1/16W smd	569-0165-102
R 108	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 109	2k ohm $\pm$ 5% 1/16W smd	569-0165-202
R 110	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 111	2k ohm $\pm$ 5% 1/16W smd	569-0165-202
R 112	2k ohm $\pm$ 5% 1/16W smd	569-0165-202
R 113	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 114	4.7k ohm $\pm$ 5% 1/16W smd	569-0165-472
R 115	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 117	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 118	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 119	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 120	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 121	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 122	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 123	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 124	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 125	220k ohm $\pm$ 5% 1/16W smd	569-0165-224
R 126	220k ohm $\pm$ 5% 1/16W smd	569-0165-224

## Logic Board Assembly (PPC Version C)

Ref No.	Description	Part No.
R 127	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 128	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 129	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 130	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 131	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 132	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 141	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 224	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 225	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 226	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 249	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 251	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 252	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 253	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 255	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 256	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 257	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 258	2k ohm $\pm 5\%$ 1/16W smd	569-0155-202
R 259	10M ohm $\pm 5\%$ 1/16W smd	569-0165-106
R 260	2k ohm $\pm 5\%$ 1/16W smd	569-0155-202
R 261	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 262	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 263	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 264	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 265	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 266	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 267	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 268	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 269	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 270	62k ohm $\pm 5\%$ 1/16W smd	569-0155-623
R 271	150k ohm $\pm 5\%$ 1/16W smd	569-0155-154
R 272	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 273	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 274	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 275	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 276	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 277	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 278	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 279	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 280	330 ohm $\pm 5\%$ 1/16W smd	569-0155-331
R 281	220k ohm $\pm 5\%$ 1/16W smd	569-0165-224
R 282	0 ohm jumper	569-0155-001
R 283	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 284	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 285	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103

Ref No.	Description	Part No.
R 286	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 287	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 288	56k ohm $\pm 5\%$ 1/16W smd	569-0155-563
R 289	390k ohm $\pm 5\%$ 1/16W smd	569-0155-394
R 290	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 291	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 292	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 293	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 294	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 295	150 ohm $\pm 5\%$ 1/16W smd	569-0155-151
R 296	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 297	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 298	150 ohm $\pm 5\%$ 1/16W smd	569-0155-151
R 299	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 300	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 301	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 302	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 303	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 304	68k ohm $\pm 5\%$ 1/16W smd	569-0165-683
R 305	0 ohm jumper	569-0155-001
R 307	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 308	0 ohm jumper	569-0155-001
R 309	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 310	6.8k ohm $\pm 5\%$ 1/16W smd	569-0155-682
R 311	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 312	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 313	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 315	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 316	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 318	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 319	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 320	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 321	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 322	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 323	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 324	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 325	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 326	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 327	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 328	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 329	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R330	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R331	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R332	470 ohm $\pm 5\%$ 1/16W smd	569-0155-471
R333	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103

## Logic Board Assembly (PPC Version C)

Ref No.	Description	Part No.
R334	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R336	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R338	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R339	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 340	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 344	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 345	470 ohm $\pm 5\%$ 1/16W smd	569-0155-471
R 346	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 348	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 351	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 353	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 355	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 356	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 357	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 358	100 ohm $\pm 5\%$ 1/16W smd	569-0155-101
R 360	10 ohm $\pm 5\%$ 1/16W smd	569-0155-100
R 361	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 362	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 364	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 365	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 366	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 367	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 368	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 369	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 370	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 371	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 372	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 373	33.2k ohm $\pm 1\%$ 0.1W smd	569-0151-451
R 374	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 377	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 378	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 379	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 392	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 393	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 394	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 395	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 396	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 399	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 400	634k ohm $\pm 1\%$ 0.1W smd	569-0151-578
R 401	100k ohm $\pm 1\%$ 0.1W smd	569-0151-501
R 402	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 403	255k ohm $\pm 1\%$ 0.1W smd	569-0151-551
R 404	100k ohm $\pm 1\%$ 0.1W smd	569-0151-501
R 405	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 406	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103

Ref No.	Description	Part No.
R 407	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 408	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 409	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 410	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 412	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 413	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 683	68k ohm $\pm 5\%$ 1/16W smd	569-0155-683
R 685	27k ohm $\pm 5\%$ 1/16W smd	569-0155-273
R 686	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 687	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 688	51k ohm $\pm 5\%$ 1/16W smd	569-0165-513
R 689	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 690	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 691	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 692	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 693	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 694	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 695	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 696	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 697	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 698	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 699	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 700	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 701	15k ohm $\pm 5\%$ 1/16W smd	569-0165-153
R 702	20k ohm $\pm 5\%$ 1/16W smd	569-0165-203
R 703	30k ohm $\pm 5\%$ 1/16W smd	569-0155-303
R 704	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 705	15k ohm $\pm 5\%$ 1/16W smd	569-0165-153
R 706	20k ohm $\pm 5\%$ 1/16W smd	569-0165-203
R 707	30k ohm $\pm 5\%$ 1/16W smd	569-0155-303
R 709	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 710	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 711	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 712	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 713	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 714	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 715	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 716	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 717	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 718	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 719	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 720	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 721	1k ohm $\pm 5\%$ 1/16W smd	569-0165-102
R 722	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472
R 723	4.7k ohm $\pm 5\%$ 1/16W smd	569-0165-472

## Logic Board Assembly (PPC Version C)

Ref No.	Description	Part No.
R 724	15k ohm $\pm 5\%$ 1/16W smd	569-0165-153
R 725	18k ohm $\pm 5\%$ 1/16W smd	569-0165-183
R 726	180 ohm $\pm 5\%$ 1/16W smd	569-0165-181
R 727	180 ohm $\pm 5\%$ 1/16W smd	569-0165-181
R 728	180 ohm $\pm 5\%$ 1/16W smd	569-0165-181
R 729	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 730	24 ohm $\pm 5\%$ 1/16W smd	569-0165-240
R 731	24 ohm $\pm 5\%$ 1/16W smd	569-0165-240
R 732	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 733	7.5k ohm $\pm 1\%$ 1/8W smd	569-0111-385
R 734	7.5k ohm $\pm 1\%$ 1/8W smd	569-0111-385
R 735	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 736	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 737	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 738	51 ohm $\pm 5\%$ 1/16W smd	569-0155-510
R 739	51 ohm $\pm 5\%$ 1/16W smd	569-0155-510
R 740	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 741	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 742	100k ohm $\pm 5\%$ 1/16W smd	569-0165-104
R 744	0 ohm jumper	569-0165-001
R 745	0 ohm jumper	569-0165-001
R 746	0 ohm jumper	569-0165-001
R 747	0 ohm jumper	569-0165-001
R 748	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 749	10 ohm $\pm 5\%$ 1/16W smd	569-0165-100
R 752	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
R 753	10k ohm $\pm 5\%$ 1/16W smd	569-0165-103
S 001	Switch, momentary norm open	583-9512-002
T 001	Isolation transformer 10BASE-T	592-9017-003
U 001	DSP TMS3205510AGGWA1	544-5003-133
U 002	CODEC, dual TLV320AIC211	544-3016-057
U 003	Schmitt trig, inv TC7S14F-TE85L	544-3123-014
U 004	Op Amp OPA340NA	544-2020-023
U 011	Regulator, 5V 400mA REG113EA-5	544-2603-055
U 013	Regulator, 5V 400mA REG113EA-5	544-2603-055
U 015	Regulator, 3.8V, 50 mA LP2982	544-5001-335
U 020	SRAM 256k x 16 CY62146V	544-5001-213
U 021	Flash, 8M X 8 bit AM29DL640G90	544-5001-255
U 022	Buffer, quad 74LCX125	544-3776-127

Ref No.	Description	Part No.
U 023	SRAM 512k x 16 CY62157CV30	544-5001-215
U 024	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 025	Buffer, quad 74LCX125	544-3776-127
U 026	3-state buffer, quad 74ACT125	544-3776-117
U 027	Schmitt trig, inv TC7S14F-TE85L	544-3123-014
U 042	Triple supply monitor LT1727	544-5001-341
U 045	RS-232 bus xcvr MAX3221EAE	544-2023-036
U 046	RS-485 bus transceiver ADM483	544-2023-073
U 048	Bus xcvr, octal 74LVCC3245	544-1010-250
U 049	Op am, quad MC3303	544-2020-008
U 056	Multiplexer triple 4053	544-1014-053
U 057	Microcontroller PowerPC MPC850	544-5003-127
U 058	EEPROM 32k x 8 M24256	544-1019-376
U 059	Multiplexer triple 4053	544-1014-053
U 060	Op am, quad MC3303	544-2020-008
U 061	Op am, quad MC3303	544-2020-008
U 063	Flip flop octal 74HC574	544-3764-576
U 064	Flip flop octal 74HC574	544-3764-576
U 065	Flip flop octal 74HC574	544-3764-576
U 066	Multiplexer triple 4053	544-1014-053
U 067	Converter, A/D 8-bit ser TLC5481	544-1010-548
U 069	RS-232 bus xcvr MAX3221EAE	544-2023-036
U 070	Analog switch, SPDT NLAS4599	544-4002-007
U 071	SRAM 512k x 16 CY62157CV30	544-5001-215
U 072	SRAM 512k x 16 CY62157CV30	544-5001-215
U 073	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 074	DC-DC converter TPS6200	544-4006-011
U 075	DC-DC converter TPS6200	544-4006-011
U 079	Tri state buffer, 3.3V NC7SZ125P5	544-3914-125
U 080	Regulator 5V LT1121IST-5	544-1011-121
U 081	Buffer, quad 74LCX125	544-3776-127
U 082	Programmable logic	544-5001-419
U 083	Op amp, quad OPA4340EA	544-2020-013
U 084	Op amp, quad OPA4340EA	544-2020-013
U 085	Transceiver, 10BASE-T 3V	544-2023-050
U 086	Reg, 3.3V 400 mA REG113EA-3.3	544-2603-056
U 087	Op amp, quad OPA4340EA	544-2020-013
Y 002	Crystal, 4.9152 MHz smd	521-3060-022
Y 003	TCXO, 12.288 MHz smd	518-7012-200
Y 004	Oscillator, 20.000 MHz smd	561-9004-200

## Front Panel Assembly

Ref No.	Description	Part No.
<b>FRONT PANEL ASSEMBLY</b> Part No. 023-5300-810		
A 151	Plastic front panel assembly	587-9650-002
A 815	Display controller board (see separate listings)	023-5300-813
C 750	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 754	1.0 $\mu$ F 35V tantalum smd	510-2628-109
C 755	4.7 $\mu$ F 10V tantalum smd	510-2624-479
DS 700	Dual color, red/grn LED	549-4001-215
DS 701- DS706	LED, green smd	549-4001-145
DS 707- DS726	LED, green smd	549-4003-011
DS 727	LCD assembly	549-4501-010
EP 101	Key cap kit (see Section 2.8)	587-5300-001
HW 010	Washer, .438 x .274 x .030	596-9410-010
HW 011	Nut, spanner 3/8 x 7mm	013-1313-018
HW 012	Screw, 2-56 x 1/4	575-1602-008
HW 013	Lockwasher, internal No. 2	596-2102-006
J 703	Connector, 13-pin circular recept	515-1009-025
J 705	Connector, 31-pin	515-7109-129
LS 001	Speaker, 2 x 3 in 16-ohm	589-1015-006
MP 101	Display bezel	017-2226-046
MP 102	Display gasket	018-1136-120
MP 103	Light pipe	032-0792-032
MP 108	Support-keypad	017-2226-090
MP 151	Gasket, front lens	018-1136-130
MP 152	Control knob	032-0792-010
MP 153	Control knob	032-0792-010
MP 154	Speaker membrane	018-1136-138
MP 155	Spacer, display board	018-1136-140
MP 158	Front panel lens	032-0792-034
MP 160	Spacer (between boards)	013-1188-053
MP 161	Keypad, standard	032-0792-031
MP 162	Speaker retainer	016-2187-250
MP 163	Speaker gasket, silicone	018-1136-128
MP 990	Gasket, microphone jack silicone	018-1136-132

## Display Controller Board (Revised)

Ref No.	Description	Part No.
NP 001	Johnson label raised	559-9001-310
NP 002	Label, RS 5300	559-5300-100
PC 010	Flex circuit, std push on-off	035-5300-010
	Flex circuit, motorcycle rot on-off	035-5300-015
PC 815	PC board, display	035-5300-815
Q 710	PNP general purpose	576-0003-650
Q 711	NPN general purpose	576-0003-658
Q 712	NPN general purpose	576-0003-658
R 800	180k ohm $\pm$ 5% 1/8W smd	569-0105-184
R 801	100k ohm $\pm$ 5% 1/8W smd	569-0105-104
R 802	100k ohm $\pm$ 5% 1/8W smd	569-0105-104
R 803	62 ohm $\pm$ 5% 2010 .75W smd	569-0135-620
R 804	62 ohm $\pm$ 5% 2010 .75W smd	569-0135-620
R 805	62 ohm $\pm$ 5% 2010 .75W smd	569-0135-620
R 806	62 ohm $\pm$ 5% 2010 .75W smd	569-0135-620
R 807	510 ohm $\pm$ 5% 1/8W smd	569-0105-511
R 808	62 ohm $\pm$ 5% 2010 .75W smd	569-0135-620
R 809	62 ohm $\pm$ 5% 2010 .75W smd	569-0135-620
R 810	510 ohm $\pm$ 5% 1/8W smd	569-0105-511
R 811	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 812	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
S 001	DIP switch, 10-position	583-5100-210
S 154	On-off/Vol push on w/50k pot std	562-0018-075
	On-off/Vol rot on-off , motorcycle	562-0018-077
S 155	Switch rotary and push	583-2042-001
U 710	LCD driver, PCF8576TD	544-2027-010
U 711	LCD driver, PCF8576TD	544-2027-010
U 712	Regulator, 8V 0.5A 78M08	544-2003-081
W 103	Cable assy, display - logic bd	023-5300-025
<b>DISPLAY CONTROLLER BOARD (REVISED)</b>		
C 001	4.7 $\mu$ F 25V tantalum smd	510-2627-479
C 002	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 003	10 $\mu$ F 25V tantalum smd	510-2627-100
C 004	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 005	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 006	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 007	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 009	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104

## Display Controller Board (Revised)

Ref No.	Description	Part No.
C 010	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 011	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 012	4.7 $\mu$ F 25V tantalum smd	510-2627-479
C 013	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 016	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 017	4.7 $\mu$ F 25V tantalum smd	510-2627-479
C 018	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 020	.01 $\mu$ F $\pm$ 10% X7R cer smd	510-3675-103
C 021	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 022	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 023	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 024	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 029	1.0 $\mu$ F 10V tantalum smd	510-2624-109
C 030	10 $\mu$ F 25V tantalum smd	510-2627-100
C 031	4.7 $\mu$ F 25V tantalum smd	510-2627-479
C 032	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 126	.01 $\mu$ F $\pm$ 10% X7R cer smd	510-3675-103
C 127	1.0 $\mu$ F 10V tantalum smd	510-2624-109
C 128	1.0 $\mu$ F 10V tantalum smd	510-2624-109
C 129	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3675-104
C 130	.047 $\mu$ F $\pm$ 10% X7R cer smd	510-3605-473
CR 001	5.6V zener SOT-23	523-2016-569
CR 002	5.6V zener SOT-23	523-2016-569
CR 003	5.6V zener SOT-23	523-2016-569
CR 004	5.6V zener SOT-23	523-2016-569
CR 005	5.6V zener SOT-23	523-2016-569
CR 006	5.6V zener SOT-23	523-2016-569
CR 007	5.6V zener SOT-23	523-2016-569
CR 008	5.6V zener SOT-23	523-2016-569
CR 009	5.6V zener SOT-23	523-2016-569
CR 010	5.6V zener SOT-23	523-2016-569
CR 011	5.6V zener SOT-23	523-2016-569
CR 012	PIN switching diode	523-1504-001
CR 013	5.6V zener SOT-23	523-2016-569
CR 014	PIN switching diode	523-1504-001
DS 727	LCD assembly	549-4501-010
F 001	Fuse 2.0 A smd	534-5001-009
J 700	Connector, 16-pin	515-7000-668
J 701	Connector, micro-miniature	515-7113-073
J 702	Connector, 9-pin ZIF flex	515-7111-321
J 704	Connector, 5-pin (PA bd cable)	515-7111-254

Ref No.	Description	Part No.
PC 001	PC board, display controller rev. 5	035-5300-810 5
Q 002	NPN general purpose	576-0003-658
Q 004	NPN digital w/resistors	576-0003-616
Q 005	NPN digital w/resistors	576-0003-616
Q 006	NPN digital w/resistors	576-0003-616
R 002	330k ohm $\pm$ 5% 1/16W smd	569-0155-334
R 003	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 005	100k ohm $\pm$ 5% 1/16W smd	569-0155-104
R 006	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 007	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 008	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 009	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 010	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 011	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 012	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 013	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 014	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 015	200k ohm $\pm$ 5% 1/16W smd	569-0155-204
R 016	200k ohm $\pm$ 5% 1/16W smd	569-0155-204
R 017	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 018	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 019	300 ohm $\pm$ 5% 1/8W smd	569-0105-301
R 020	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 021	100k ohm $\pm$ 5% 1/16W smd	569-0155-104
R 022	300 ohm $\pm$ 5% 1/8W smd	569-0105-301
R 023	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 024	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 025	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 026	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 027	51 ohm $\pm$ 5% 1/8W smd	569-0105-510
R 028	100k ohm $\pm$ 5% 1/16W smd	569-0155-104
R 029	100k ohm $\pm$ 5% 1/16W smd	569-0155-104
R 030	10k ohm $\pm$ 5% 1/16W smd	569-0155-103
R 031	300ohm $\pm$ 5% 1/16W smd	569-0155-301
R 032	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 033	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 035	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 036	620 ohm $\pm$ 5% 1/8W smd	569-0105-621
R 037	620 ohm $\pm$ 5% 1/8W smd	569-0105-621
R 038	47k ohm $\pm$ 5% 1/16W smd	569-0155-473
R 039	300ohm $\pm$ 5% 1/16W smd	569-0155-301
R 040	10k ohm $\pm$ 5% 1/16W smd	569-0155-103



## Display Controller Board (Revised)

Ref No.	Description	Part No.
R 041	3.3k ohm $\pm 5\%$ 1/16W smd	569-0155-332
R 042	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 043	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 044	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 045	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 046	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 047	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 048	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 049	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 050	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 051	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 052	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 054	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 055	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 056	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 057	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 058	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 059	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 060	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 061	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 062	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 063	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 064	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 065	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 066	3.3k ohm $\pm 5\%$ 1/16W smd	569-0155-332
R 067	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 068	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 069	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 070	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 071	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 072	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 073	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 074	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 075	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 076	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 077	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 078	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 079	5.1kohm $\pm 5\%$ 1/16W smd	569-0155-512
R 080	300ohm $\pm 5\%$ 1/16W smd	569-0155-301
R 082	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 083	3.3k ohm $\pm 5\%$ 1/16W smd	569-0155-332
R 084	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 085	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 087	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 089	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102

## Display Controller Board (Unrevised)

Ref No.	Description	Part No.
R 090	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 091	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 092	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 093	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 094	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 095	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 096	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 097	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 098	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 099	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 100	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 101	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 102	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 103	1.2M ohm $\pm 5\%$ 1/16W smd	569-0155-125
R 104	200k ohm $\pm 5\%$ 1/16W smd	569-0155-204
R 105	240k ohm $\pm 5\%$ 1/16W smd	569-0155-244
R 107	82k ohm $\pm 5\%$ 1/16W smd	569-0155-823
R 108	160k ohm $\pm 5\%$ 1/16W smd	569-0155-164
R 109	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 110	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 111	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 112	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 113	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 114	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 115	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 116	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
U 002	Op am, quad MC3303	544-2020-008
U 003	RS-485 driver SN65176	544-2023-027
U 009	Microcontroller MC68HC908	544-9100-007
U 012	5V regulator, 300 mA ADP3367	544-2032-009
U 045	3-state noninv amp TC74VHC125	544-3991-125
U 047	5V regulator, 300 mA ADP3367	544-2032-009
U 054	Schmitt trigger, hex 74HC14	544-3991-014
U 055	Flip-flop, dual 74HC74	544-3991-074
U 056	Buffer, open drain hex MM74C906	544-3716-906
Y 002	4.9152 MHz crystal	521-3060-024
<b>DISPLAY CONTROLLER BOARD (UNREV.)</b>		
C 701	4.7 $\mu$ F 20V tantalum smd	510-2626-479
C 702	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104
C 703	.1 $\mu$ F $\pm 10\%$ X7R 50V cer smd	510-3606-104

## Display Controller Board (Unrevised)

Ref No.	Description	Part No.
C 704	4.7 $\mu$ F 20V tantalum smd	510-2626-479
C 705	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 706	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 707	4.7 $\mu$ F 20V tantalum smd	510-2626-479
C 708	20 pF $\pm$ 5% NPO cer smd	510-3601-200
C 709	20 pF $\pm$ 5% NPO cer smd	510-3601-200
C 710	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 711	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 712	.047 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3605-473
C 713	4.7 $\mu$ F 6.3V tantalum smd	510-2623-479
C 714	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 715	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 716	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 717	.1 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-104
C 751	.01 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-103
C 752	.01 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-103
C 753	.01 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-103
C 756	.01 $\mu$ F $\pm$ 10% X7R 50V cer smd	510-3606-103
CR 701	HC diode SOT-23	523-1504-016
F 700	Fuse, 2.0 A smd	534-5001-009
J 101	Connector, 2-pin	515-9031-281
J 102	Connector, elastomeric	515-9900-002
PC 710	PC board, display/controller	035-5300-710
Q 701	NPN general purpose	576-0003-658
Q 702	NPN general purpose	576-0003-658
R 701	620 ohm $\pm$ 5% 1/8W smd	569-0105-621
R 702	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 703	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 704	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 705	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 706	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 707	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 708	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 709	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 710	620 ohm $\pm$ 5% 1/8W smd	569-0105-621
R 711	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 712	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 713	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 714	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 715	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 716	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 717	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 718	47k ohm $\pm$ 5% 1/8W smd	569-0105-473

Ref No.	Description	Part No.
R 720	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 721	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 722	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 723	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 724	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 725	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 726	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 727	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 728	1M ohm $\pm$ 5% 1/8W smd	569-0105-105
R 729	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 730	4.7k ohm $\pm$ 5% 1/8W smd	569-0105-472
R 731	3.3k ohm $\pm$ 5% 1/8W smd	569-0105-332
R 732	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 733	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 734	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 735	4.7k ohm $\pm$ 5% 1/8W smd	569-0105-472
R 736	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 737	4.7k ohm $\pm$ 5% 1/8W smd	569-0105-472
R 738	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 739	3.3k ohm $\pm$ 5% 1/8W smd	569-0105-332
R 740	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 741	300 ohm $\pm$ 5% 1/8W smd	569-0105-301
R 742	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 743	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 744	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 745	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 746	3.3k ohm $\pm$ 5% 1/8W smd	569-0105-332
R 747	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 748	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 749	470 ohm $\pm$ 5% 1/8W smd	569-0105-471
R 750	470 ohm $\pm$ 5% 1/8W smd	569-0105-471
R 751	470 ohm $\pm$ 5% 1/8W smd	569-0105-471
R 752	Zero ohm jumper	569-0105-001
R 753	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 754	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 755	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 756	Zero ohm jumper	569-0105-001
R 757	100k ohm $\pm$ 5% 1/8W smd	569-0105-104
R 758	Zero ohm jumper	569-0105-001
R 762	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 763	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 764	10k ohm $\pm$ 5% 1/8W smd	569-0105-103
R 765	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 766	47k ohm $\pm$ 5% 1/8W smd	569-0105-473
R 767	300 ohm $\pm$ 5% 1/8W smd	569-0105-301

## Remote Control Unit Unique Parts

Ref No.	Description	Part No.
R 768	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 769	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 770	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 771	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 772	200k ohm $\pm 5\%$ 1/8W smd	569-0105-204
R 774	300 ohm $\pm 5\%$ 1/8W smd	569-0105-301
R 775	200k ohm $\pm 5\%$ 1/8W smd	569-0105-204
R 776	51 ohm $\pm 5\%$ 1/8W smd	569-0105-510
R 777	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 778	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 779	100k ohm $\pm 5\%$ 1/8W smd	569-0105-104
R 780	300 ohm $\pm 5\%$ 1/8W smd	569-0105-301
R 781	300 ohm $\pm 5\%$ 1/8W smd	569-0105-301
R 813	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 814	47k ohm $\pm 5\%$ 1/8W smd	569-0105-473
R 815	1.0k ohm $\pm 5\%$ 1/8W smd	569-0105-102
U 700	Op amp, quad MC3303	544-2020-008
U 701	RS-485 driver SN65176	544-2023-027
U 702	Regulator, 5V LP2951	544-2003-067
U 703	Microprocessor, MC	023-9998-450
U 704	Buffer, open drain MM74C906	544-3716-906
Y 700	3.6864 MHz crystal fundamental	521-0003-685
REMOTE CONTROL UNIT UNIQUE PARTS		
A 001	Remote audio amp bd assy (rev)	023-5300-751
	Remote audio amp bd assy (unrev) (see separate listing which follows)	023-5300-750
A 002	Front panel assembly (see preceding listing)	023-5300-810
A 755	Audio PA board cable	023-5300-755
HW 001	Washer, poly 0.937 diameter	596-6400-015
HW 002	Washer, SS spring 3/4 OD	596-9260-001
HW 003	Screw, captive pan head .75	575-9606-018
MP 001	Knob, remote control unit	032-0792-015
MP 002	Mounting bracket, rem ctrl unit	017-2226-050
MP 003	Gasket	032-0792-066
MP 005	Housing, remote control unit	032-0792-130
MP 006	Rear cover, remote control unit	032-0792-135
NP 002	Johnson label	559-9001-310
W 003	Control cable, 17-ft	597-2002-262
	Control cable, 8-ft motorcycle	597-2002-259

Ref No.	Description	Part No.
	Control cable, 50-ft	597-2002-263
W 104	Control unit pigtail cable, std	597-2002-264
	Ctrl unit pigtail cable, motorcycle	597-2002-274
AUDIO AMP BOARD (REVISED) Part No. 023-5300-751		
C 001	15 $\mu$ F 20V tantalum smd	510-2626-150
C 002	15 $\mu$ F 20V tantalum smd	510-2626-150
C 003	0.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3606-104
C 004	1 $\mu$ F 35V tantalum smd	510-2628-109
C 005	0.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3606-104
J 001	Header, 2-pin right angle	515-7100-602
J 002	Connector, 5-pin	515-7111-254
PC 001	PC board, audio amp revised	035-5300-75002
Q 001	NPN general purpose smd	576-0003-616
R 001	7.5k ohm $\pm 5\%$ 1/8W smd	569-0155-752
R 003	10k ohm $\pm 5\%$ 1/8W smd	569-0155-103
U 001	Audio amp, 3W TDA7056A	544-2006-025
AUDIO AMP BOARD (UNREVISED) Part No. 023-5300-750		
C 001	0.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3606-104
C 002	0.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3606-104
C 003	1.0 $\mu$ F 35V tantalum smd	510-2628-109
C 004	15 $\mu$ F 20V tantalum smd	510-2626-150
C 005	15 $\mu$ F 20V tantalum smd	510-2626-150
C 006	15 $\mu$ F 20V tantalum smd	510-2626-150
C 007	22 pF NPO $\pm 5\%$ 50V cer smd	510-3601-220
C 008	0.1 $\mu$ F X7R $\pm 10\%$ 50V cer smd	510-3606-104
CR 001	3.3V zener	523-2016-339
J 001	Header, 2-pin friction lock	515-9031-201
PC 001	PC board, audio amp	035-5300-750
Q 001	NPN general purpose smd	576-0003-616
R 001	470 ohm $\pm 5\%$ 1/8W smd	569-0105-471
R 002	33k ohm $\pm 5\%$ 1/8W smd	569-0105-333
R 003	180k ohm $\pm 5\%$ 1/8W smd	569-0105-184
R 005	4.7k ohm $\pm 5\%$ 1/8W smd	569-0105-472
R 006	7.5k ohm $\pm 5\%$ 1/8W smd	569-0105-752
R 007	33k ohm $\pm 5\%$ 1/8W smd	569-0105-333
R 008	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
U 001	Audio amp, 3W TDA7056A	544-2006-025
U 002	Voltage regulator, adj TK11900	544-2603-093

**Std. DC Power Cable**

Ref No.	Description	Part No.
<b>Std. DC Power Cable Assembly</b> <b>Part No. 023-9750-010</b>		
A 001	Fused DC power cable (see separate listing)	023-9650-008
A 002	Mic clip ground wire	023-7171-911
EP 002	Ring terminal, 3/4 10-12 AWG	586-0001-036
EP 003	Ring terminal, 3/8 10-12 AWG	586-0001-019
F 101	Fuse, 15 amp 32V	534-0003-038
HW 000	Key extraction tool	017-2226-000
HW 002	Screw, 4-40 x 3/8 pan head (1)	575-0604-012
HW 003	Screw, 4-24 x 1/4 phil (3)	575-3604-008
HW 004	Screw, 4-20 x 5/8 phil (3)	575-5604-020
MP 001	Heavy-duty mic clip	023-3514-001
<b>Fused DC Power Cable</b> <b>Part No. 023-9650-008</b>		
EP 101	Female crimp pin	515-9032-540
FH 001	Fuse holder in-line includes:	
	Contact	534-1004-037
	Body	534-1004-031
	Knob	534-1004-032
	Spring	534-1004-035
HW 101	Wire seal	574-9025-035
ML 001	Negative ground warning tag	559-4014-001
ML 002	Jump start warning label	559-4057-010
P 101	2-pin female power connector	515-9032-535
W 101	Wire, 12 AWG stranded blue	597-7021-206
W 102	Wire, 12 AWG stranded red	597-7021-202
<b>100W DC Power Cable Assembly</b> <b>Part No. 023-5315-100</b>		
A 002	Mic clip ground wire	023-7171-911
EP 001a	1/4 ring terminal 14-16 AWG	586-0001-013
EP 001b	Ring terminal, 1/4 8 AWG	586-0001-028
EP 002	Ring terminal, 6/8 AWG	586-0001-034
EP 006	Heat shrink tubing, 3/8	042-0241-556
EP 007	Contact, 60-amp 6/8 AWG	515-9032-563
EP 008	Contact, 60-amp 6/8 AWG	515-9032-563
EP 009	Butt splice, 6/8 AWG	586-9008-063
F 001	Fuse, 35-amp max, bladed	534-0018-035
FH 001	Fuseholder, max in-line	534-1100-001
HW 011	Screw, 4-40 x .375 pan hd (1)	575-0604-012
HW 012	Screw, 4-24 phil sheet mt (3)	575-3604-010

**Amplified Dynamic Microphone**

Ref No.	Description	Part No.
HW 013	Screw, 4-20 ph phil cps (3)	575-5604-020
HW 014	Screw, 10-24 x 7/16 hex hd (4)	575-8911-014
HW 015	Screw, self-drilling (4)	575-9077-565
HW 016	Washer, flat 10 (4)	596-2410-014
HW 017	Screw, 1/4-20 hex dogpoint (2)	575-9005-018
HW 018	Screw, 1/4 x 5/16 hex hd wshr (4)	575-8708-010
HW 019	Screw, 5/16 x 3/8 hex hd wshr (4)	575-8710-012
HW 020	Screw, self drill #10 zps (4)	575-9077-545
MP 001a	Heavy duty mic clip	023-3514-001
MP 001b	Housing, 75-amp black	515-9032-557
MP 002	Housing, 75-amp red	515-9032-559
MP 003	Connector boot, power 8 AWG	574-9025-015
W 001	8 AWG black cable (3 ft)	597-7020-800
W 002	8 AWG str cu vin red (2, 18 ft)	597-7020-802
<b>Accessory Wire Harness Kit</b> <b>Part No. 023-9750-011</b>		
	Fuseholder components:	
EP 001	Contact	586-9004-001
F 001	Fuse, 1A 250V FB AGC	534-0003-020
MP001	Fuseholder body	534-1004-031
MP002	Fuseholder knob	534-1004-032
MP003	Fuseholder spring	534-1004-035
HW 001	Pin contact, crimp type	515-1501-055
P 101	8-pin receptacle housing	515-1501-050
<b>Front Mounting Bracket Assembly</b> <b>Part No. 023-9750-012</b>		
HW 001	Self-drilling screw 1/4 (4)	575-9077-565
HW 002	Self-drilling screw #10 (4)	575-9077-545
MP 101	Knob 10-32 1/2	547-0016-007
MP 201	Transceiver mounting bracket	017-2226-034
<b>Amplified Dynamic Microphone</b> <b>Part No. 250-0740-310</b>		
C 001	3.3 $\mu$ F 16V tantalum chip	510-2625-339
C 002	220 pF $\pm$ 5% NPO 50V cer chip	510-3602-221
EP001	Contact .038" diameter	586-9008-100
EP002	Mic cord w/Hirose connector	597-2002-255
EP004	Terminal (on hanger)	022-0069-011
HW001	Screw 4-20 x 3/8	575-5604-012
HW004	Screw 2-56 x 3/8	575-1602-012
MK001	Dynamic mic cartridge	589-1011-003
MP001	Case front black	032-0426-100

**15W, 4.0-Ohm Speaker**

Ref No.	Description	Part No.
MP002	Case back black	032-0427-100
MP003	Actuator black	032-0428-050
MP004	Cartridge gasket	032-0429-075
MP005	Blast filter	018-1033-002
MP006	Switch bracket	017-1885-030
MP007	Hanger button	013-1216-005
MP008	Crimp retainer	017-2222-006
MP009	Rubber bumper	018-0798-009
MP010	Backing plate	015-0876-026
MP011	Strain relief, mic cord	032-0429-086
MP012	Shim support, rubber bumper	017-2222-007
MP020	Foam support	018-0798-012
NP001	Nameplate	559-0039-026
PC001	PC board, amplifier	035-0441-020
Q 001	NPN amplifier SOT-23	576-0003-658
R 001	51k ohm $\pm 5\%$ 1/8W chip	569-0115-513
R 002	18 ohm $\pm 5\%$ 1/8W chip	569-0115-180
S 001	Leaf switch SPST	583-1004-031

**15 Watt, 4.0-ohm Speaker (Black)****Part No. 250-0151-006**

HW001	Strain relief (in case back)	574-0003-008
HW002	Screw, self drilling	574-9077-543
HW003	Screw, 4-20 x 1/2 pan head	575-5604-016
HW005	Foam gasket	018-1126-001
HW006	Urethane foam, 1/16 thick	042-0361-318
HW008	Screw, 6-19 x 1/4 pan hd phillips	575-5606-008
HW009	Terminal lug	586-0005-106
LS001	Speaker, 5" 15W 4.0 ohm	589-1016-003
MP001	Case front (black)	032-0758-004
MP002	Case back (black)	032-0759-004
MP003	Mounting bracket (black)	032-0760-004
MP004	Tri knob 10-32	547-0016-004
NP001	Overlay, speaker front	559-0072-010
P 001	Crimp wire contact	515-5010-055
W 001	Speaker wire, 22 AWG (6 ft used)	597-2006-002

**15 Watt, 4.0-ohm Motorcyle Speaker****Part No. 250-0151-015**

HW001	Strain relief (in case back)	574-0003-008
	Rubber switch boot	574-3500-153
HW002	Screw, self drilling	574-9077-543
HW003	Screw, 4-20 x 1/2 pan head	575-5604-016
HW005	Foam gasket	018-1126-001
HW006	Urethane foam, 1/16 thick	042-0361-318

**Handheld Control Unit**

Ref No.	Description	Part No.
HW008	Screw, 6-19 x 1/4 pan hd phillips	575-5606-008
HW009	Terminal lug	586-0005-106
LS001	Speaker, 5" 15W 4.0 ohm	589-1016-003
MP001	Case front (black)	032-0758-004
MP002	Case back, motorcyle (black)	032-0759-006
MP003	Mounting bracket (black)	032-0760-004
MP004	Tri knob 10-32	547-0016-004
NP001	Overlay, speaker front	559-0072-010
S 001	Switch, SPST toggle	583-0006-061
W 001	Speaker wire, motorcycle	023-0151-011

Ref No.	Description	Part No.
<b>HANDHELD CONTROL UNIT</b>		
<b>Part No. 250-5300-101</b>		
A 001	Main board assembly	023-5300-705
A 002	Keypad board assembly	023-5300-707
A 130	Junction box assembly (see separate listing)	023-5300-130
C 001	4.7 $\mu$ F 25V tantalum smd	510-2627-479
C 002	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 003	10 $\mu$ F 25V tantalum smd	510-2627-100
C 005	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 007	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 008	33 pF $\pm 5\%$ NPO 25V cer smd	510-3674-330
C 009	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 010	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 011	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 013	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 014	0.01 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-103
C 015	0.01 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-103
C 016	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 017	4.7 $\mu$ F 25V tantalum smd	510-2627-479
C 018	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 019	390 pF $\pm 5\%$ NPO 25V cer smd	510-3674-391
C 020	0.01 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-103
C 021	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 022	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 023	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 025	180 pF $\pm 5\%$ NPO 25V cer smd	510-3674-181
C 029	1.0 $\mu$ F 10V tantalum smd	510-2624-109
C 030	10 $\mu$ F 25V tantalum smd	510-2627-100

## Handheld Control Unit

Ref No.	Description	Part No.
C 031	4.7 $\mu$ F 20V tantalum smd	510-2626-479
C 032	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 126	0.01 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-103
C 127	1.0 $\mu$ F 10V tantalum smd	510-2624-109
C 128	1.0 $\mu$ F 10V tantalum smd	510-2624-109
C 129	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 130	4.7 $\mu$ F 25V tantalum smd	510-2627-479
C 131	10 $\mu$ F 25V tantalum smd	510-2627-100
C 132	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 133	10 $\mu$ F 25V tantalum smd	510-2627-100
C 134	10 $\mu$ F 25V tantalum smd	510-2627-100
C 135	4.7 $\mu$ F tantalum smd	510-2622-479
C 136	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 137	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 138	1.0 $\mu$ F 35V tantalum smd	510-2628-109
C 139	0.22 F 5.5V electrolytic	510-9510-055
C 140	10 $\mu$ F 25V tantalum smd	510-2627-100
C 141	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 142	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 143	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 144	0.047 $\mu$ F X7R $\pm$ 10% cer smd	510-3605-473
C 145	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
C 146	0.1 $\mu$ F $\pm$ 10% X7R 25V cer smd	510-3675-104
CR 004- CR 11	5.6V zener	523-2016-569
CR 012	Pin switching diode	523-1504-001
CR 013	5.6V zener	523-2016-569
CR 020	5.6V zener	523-2016-569
CR 021	5.6V zener	523-2016-569
CR 023	5.6V zener	523-2016-569
CR 024	Dual color LED, red/grn	549-4001-215
CR 025- CR 29	5.6V zener	523-2016-569
CR 030	Dual diodes,com anodes	523-1504-024
CR 031	Dual diodes,com anodes	523-1504-024
CR 033	Dual diodes,com anodes	523-1504-024
CR 034	Dual diodes,com anodes	523-1504-024
DS 001	LCD, glass	549-4501-011
DS 002	Fiberoptics, backing	549-4501-032
DS 024	LED, green	549-4003-011
DS27-35	LED, green	549-4003-011
EP 001	Spade terminal #6	586-0003-034
HW 01a	Screw, 6-32 x 5/16	575-1606-010

Ref No.	Description	Part No.
HW 01b	Spacer, keypad board	013-1188-055
HW 01c	Screw, 4-40 x 1/4	575-1604-008
HW 02a	Screw, 2-56 x 5/8 Torx black	575-8002-020
HW 02b	Washer, split lock #4	596-1304-008
HW 003	Lockwasher, internal #6	596-1106-009
J 003	Connector, 12-pin socket .100	515-5300-001
MK 001	Microphone cartridge	589-0301-003
MP 01a	Mic hanger button	013-1216-007
MP 01b	Display bezel	017-2226-048 3
MP 01c	Mic element isolator	032-0757-834
MP 02a	Back housing	032-0792-056
MP 02b	Backplate, fiber optic backlighting	032-0792-054
MP 03a	Keypad, rubber revised	032-0792-059 2
MP 03b	Elastomeric connector	515-9900-010
MP 004	Fiber sheet 12 x 21	058-0021-002
MP 005	Fiber sheet 12 x 21	058-0021-002
MP 006	Gasket seal assembly	587-0792-048
MP 008	Front housing assembly	587-0792-058
MP 009	Water barrier, microphone	574-5300-001
MP 010	Lens, front housing	032-0792-052
MP 011	Lens gasket, front housing	574-3500-080
MP 012	Lens PSA, front housing	574-3500-082
NP 001	Label, EFJ logo front	559-5000-550
P 001	Connector, 11-pin single row	515-9036-021
P 003	Connector, 12-pin single row	515-5300-003
PC 001	Main PC board, rev 3	035-5300-700 3
PC 001	Keypad board, rev 0	035-5300-707
Q 002	NPN general purpose	576-0003-658
Q 004	NPN digital w/resistors	576-0003-616
Q 005	NPN digital w/resistors	576-0003-616
Q 006	NPN digital w/resistors	576-0003-616
Q 007	NPN general purpose	576-0003-658
Q 008	NPN general purpose	576-0003-658
Q 009	NPN general purpose	576-0003-658
Q 010	PNP general purpose	576-0003-650
Q 012	Power MOSFET 20 volt	576-0006-244
Q 013	Power MOSFET 20 volt	576-0006-244
R 002	330k ohm $\pm$ 5% 1/16W smd	569-0155-334

## Handheld Control Unit

Ref No.	Description	Part No.
R 003	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 005	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 006	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 007	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 008	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 009	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 010	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 011	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 012	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 013	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 015	200k ohm $\pm 5\%$ 1/16W smd	569-0155-204
R 016	200k ohm $\pm 5\%$ 1/16W smd	569-0155-204
R 017	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 018	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 019	300 ohm $\pm 5\%$ 1/8W smd	569-0105-301
R 021	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 022	300 ohm $\pm 5\%$ 1/8W smd	569-0105-301
R 028	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 029	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 034	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 040	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 042	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 043	4.7kohm $\pm 5\%$ 1/16W smd	569-0155-472
R 044	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 045	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 046	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 047	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 051	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 052	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 053	33k ohm $\pm 5\%$ 1/16W smd	569-0155-333
R 054	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 055	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 056	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 057	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 058	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 059	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 060	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 061	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 062	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 063	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 064	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 065	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 066	3.3k ohm $\pm 5\%$ 1/16W smd	569-0155-332
R 067	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 068	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103

Ref No.	Description	Part No.
R 069	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 070	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 071	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 072	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 073	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 074	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 075	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 076	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 077	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 078	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 079	5.1k ohm $\pm 5\%$ 1/16W smd	569-0155-512
R 080	300 ohm $\pm 5\%$ 1/16W smd	569-0155-301
R 082	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 083	3.3k ohm $\pm 5\%$ 1/16W smd	569-0155-332
R 084	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 087	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 090	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 093	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 095	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 096	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 097	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 098	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 099	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 100	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 101	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 102	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 103	1.2M ohm $\pm 5\%$ 1/16W smd	569-0155-125
R 104	200k ohm $\pm 5\%$ 1/16W smd	569-0155-204
R 105	240k ohm $\pm 5\%$ 1/16W smd	569-0155-244
R 106	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 107	82k ohm $\pm 5\%$ 1/16W smd	569-0155-823
R 108	160k ohm $\pm 5\%$ 1/16W smd	569-0155-164
R 109	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 110	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 111	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 112	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 113	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 114	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 115	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 116	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 118	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 119	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 120	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 121	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 122	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473

## Handheld Control Unit

Ref No.	Description	Part No.
R 123	47k ohm $\pm 5\%$ 1/16W smd	569-0155-473
R 124	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 125	2.2k ohm $\pm 5\%$ 1/16W smd	569-0155-222
R 126	510 ohm $\pm 5\%$ 1/8W smd	569-0115-511
R 127	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 128	510 ohm $\pm 5\%$ 1/8W smd	569-0115-511
R 129	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 130	150 ohm $\pm 5\%$ 3/4W smd	569-0135-151
R 131	150 ohm $\pm 5\%$ 3/4W smd	569-0135-151
R 134	100 ohm $\pm 5\%$ 3/4W smd	569-0135-101
R 135	100 ohm $\pm 5\%$ 3/4W smd	569-0135-101
R 136	100 ohm $\pm 5\%$ 3/4W smd	569-0135-101
R 137	100 ohm $\pm 5\%$ 3/4W smd	569-0135-101
R 138	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 139	4.7k ohm $\pm 5\%$ 1/16W smd	569-0155-472
R 140	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 141	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 142	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 143	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 144	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 145	180k ohm $\pm 5\%$ 1/16W smd	569-0155-184
R 146	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 147	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 150	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 151	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 152	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 153	1k ohm $\pm 5\%$ 1/8W smd	569-0115-102
R 154	1k ohm $\pm 5\%$ 1/8W smd	569-0115-102
R 155	1k ohm $\pm 5\%$ 1/8W smd	569-0115-102
R 156	1k ohm $\pm 5\%$ 1/8W smd	569-0115-102
S 001	10 Pos DIP switch	583-5100-210
S 022	Light touch switch	583-4020-015
S 027	Light touch switch	583-4020-015
S 029	Light touch switch	583-4020-015
S 030	KT series switch, right angle	583-9228-003
U 002	Op amp, quad MC3303	544-2020-008
U 003	RS-485 bus transceiver ADM483	544-2023-073
U 009	Microcontroller MC68HC908	544-9100-007
U 012	Regulator, 5V 300mA ADP3367	544-2032-009
U 045	Non-inverting buffer, quad TC74VHC125	544-3991-125
U 047	Regulator, 5V 300mA ADP3367	544-2032-009
U 054	Schmitt trigger, hex 74C14	544-3991-014
U 056	Open drain buffer, hex 74C906	544-3716-906

## HHC Junction Box Assembly

Ref No.	Description	Part No.
U 057	Regulator, 5V 300mA ADP3367	544-2032-009
U 058	Regulator, 8V 0.5A 78M08	544-2003-081
U 059	Univ LCD driver PCF8576	544-2027-010
U 060	Univ LCD driver PCF8576	544-2027-010
U 061	Voltage reference, 2.5V LM4120	544-2032-008
U 062	D flip-flop TC7W74FU	544-1010-014
U 063	D flip-flop TC7W74FU	544-1010-014
W 001	Coil cord assembly	597-2002-272
W 503	Control cable, 17 ft. junc - xcvr	597-2002-267
Y 002	Crystal, 4.9152 MHz smd	521-3060-024
<b>HHC Junction Box Assembly</b> Part No. 023-5300-130		
C 001	2.2 uF 20V tantalum smd	510-2626-229
C 002	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 003	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 004	2.2 uF 20V tantalum smd	510-2626-229
C 005	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 006	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 008	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 009	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 010	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 011	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 012	1 $\mu$ F X7R $\pm 10\%$ 16V cer smd	510-3606-105
C 013	1 $\mu$ F X7R $\pm 10\%$ 16V cer smd	510-3606-105
C 014	1 $\mu$ F X7R $\pm 10\%$ 16V cer smd	510-3606-105
C 015	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 016	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 018	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 019	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 020	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 021	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 022	1 $\mu$ F X7R $\pm 10\%$ 16V cer smd	510-3606-105
C 023	2.2 uF 35V tantalum smd	510-2628-338
C 024	10 uF 25V tantalum smd	510-2627-100
C 025	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 026	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 027	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 028	1 $\mu$ F X7R $\pm 10\%$ 16V cer smd	510-3606-105
C 029	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
C 030	0.1 $\mu$ F $\pm 10\%$ X7R 25V cer smd	510-3675-104
F 001	Fuse 2.0 A smd	534-5001-009
HW 001	Spacer, 4-40 Hex male/fem	013-1160-103



## HHC Junction Box Assembly

Ref No.	Description	Part No.
HW 002	Screw, 4-40 x .25	575-0604-008
HW 003	Screw, 8-18 hex hd sht mtl	575-3908-016
HW 004	Polarizing key box cnt	515-7109-010
J 001	Connector, 10-pin	515-7104-005
J 002	Connector, 15-pin PC mt female	515-0506-115
J 003	Connector, 15-pin	515-0506-119
J 005	3.6 mm (1/8) jack enclosed	515-2001-011
J 006	3.6 mm (1/8) jack enclosed	515-2001-011
J 007	2.5 mm (3/32) audio jack, stereo	515-2002-040
MP 002	Extrusion	014-0777-023
MP 003	Front Panel	017-5300-001
MP 004	Back Panel, revision 2	017-5300-003 2
MP 005	Mounting bracket, junction box	017-5300-005
MP 130	Fiber sheet, 12 x 21	058-0021-002
NP 001	Label, HHC junction box	559-5000-501
PC 001	PC board, junction box rev 2	035-5300-130 2
Q 001	NPN general purpose	576-0003-658
Q 002	NPN general purpose	576-0003-658
R 001	30k ohm $\pm 5\%$ 1/16W smd	569-0155-303
R 002	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 003	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 004	39k ohm $\pm 5\%$ 1/16W smd	569-0155-393
R 005	62k ohm $\pm 5\%$ 1/16W smd	569-0155-623
R 006	62k ohm $\pm 5\%$ 1/16W smd	569-0155-623
R 007	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 008	1k ohm $\pm 5\%$ 1/16W smd	569-0155-102
R 009	2.7k ohm $\pm 5\%$ 1/16W smd	569-0155-272
R 010	8.2k ohm $\pm 5\%$ 1/16W smd	569-0155-822
R 012	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 013	30k ohm $\pm 5\%$ 1/16W smd	569-0155-303
R 014	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 015	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 016	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 017	220k ohm $\pm 5\%$ 1/16W smd	569-0155-224
R 018	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 019	39k ohm $\pm 5\%$ 1/16W smd	569-0155-393
R 020	62k ohm $\pm 5\%$ 1/16W smd	569-0155-623
R 021	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 022	62k ohm $\pm 5\%$ 1/16W smd	569-0155-623
R 023	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 024	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 025	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203

Ref No.	Description	Part No.
R 026	200k ohm $\pm 5\%$ 1/16W smd	569-0155-204
R 027	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 028	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 029	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 030	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 031	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 032	300 ohm $\pm 5\%$ 1/16W smd	569-0155-301
R 033	300 ohm $\pm 5\%$ 1/16W smd	569-0155-301
R 034	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 035	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 036	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 037	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 038	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 039	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 040	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 041	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 042	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 043	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 044	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 045	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 046	20k ohm $\pm 5\%$ 1/16W smd	569-0155-203
R 047	100k ohm $\pm 5\%$ 1/16W smd	569-0155-104
R 049	150 ohm $\pm 5\%$ 1/16W smd	569-0115-151
R 050	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
R 051	10k ohm $\pm 5\%$ 1/16W smd	569-0155-103
S 001	Relay, photo MOS 1.3A 100V	544-1020-035
S 002	Relay, photo MOS 1.3A 100V	544-1020-035
U 001	Op amp, quad MC3303	544-2020-008
U 003	Op amp, quad MC3303	544-2020-008
U 004	Audio amp, stereo 150 mW TPA122	544-2006-030
U 005	Switch, bilateral MC14066B	544-3016-066
U 006	Op amp, quad MC3303	544-2020-008
U 007	Comparator, dual LM2903	544-2025-009
U 009	Regulator, 5V 0.5A 78M05	544-2003-079
<b>SIREN CONTROLLER KIT</b> <b>Part No. 250-5300-101</b>		
A 001	Siren wire kit (see separate listing)	023-5300-101
A 015	Siren system, w/ctrlr, amp, cable	585-5300-015

## Siren Controller Kit

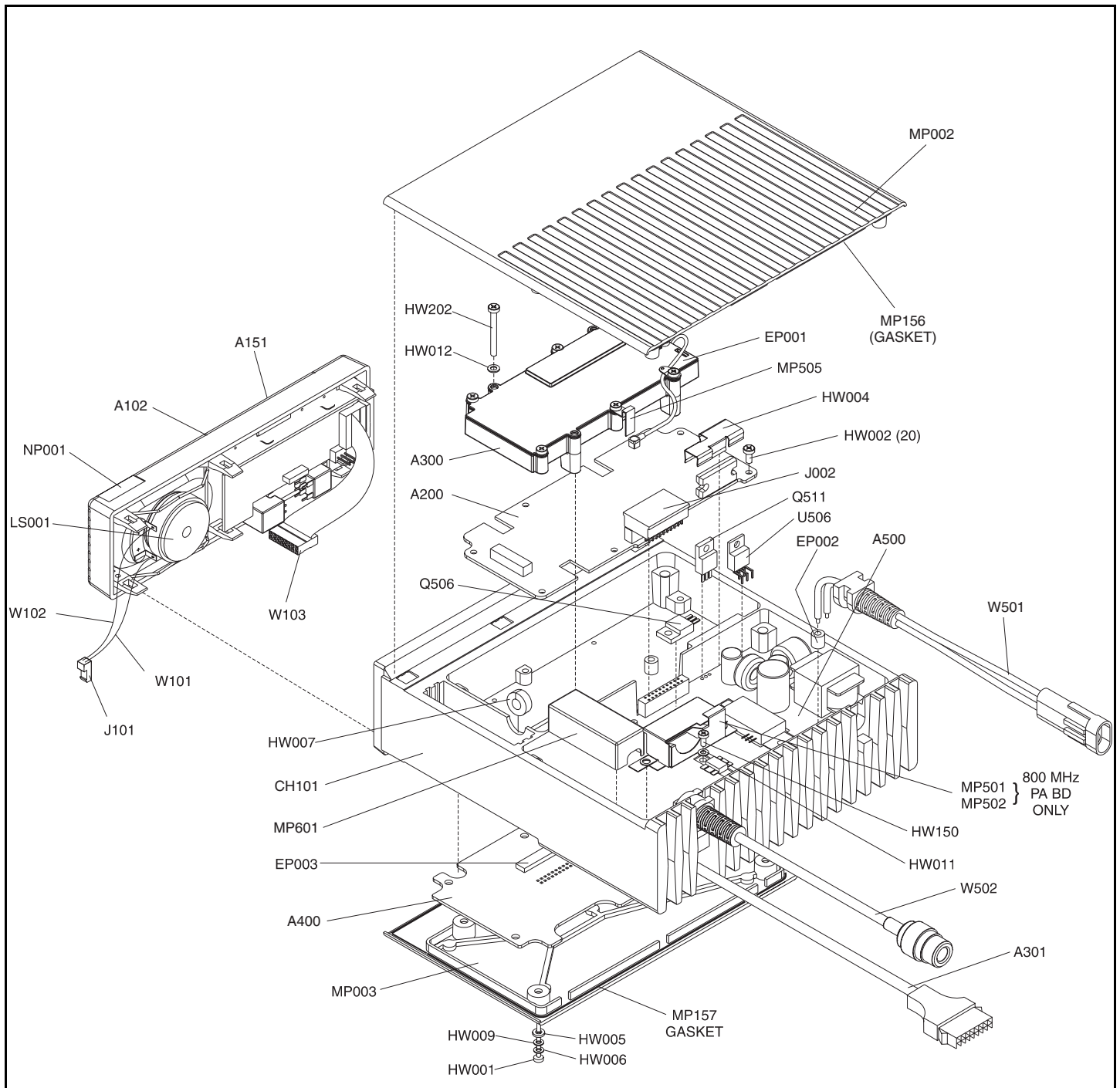
Ref No.	Description	Part No.
<b>Siren Wire Kit</b> <b>Part No. 023-5300-101</b>		
F 001	Fuse, 15A 32V	534-0332-015
FH001	Fuseholder, in-line	534-1100-003
HW001	Ring terminal, 1/4 12-16 AWG	586-0001-150
HW002	Solder splice terminator .100-.175	586-0007-085
W 001	Wire, zip cord 14 AWG	597-2006-004
W 002	Wire, 14 AWG black stranded	597-7021-400
W 003	Wire, 14 AWG red stranded	597-7021-402
<b>REMOTE PROG. INTERFACE (RPI)</b> <b>Part No. 023-5300-000</b>		
C 003	.1 $\mu$ F $\pm 10\%$ X7R 50V smd	510-3606-104
C 004	.1 $\mu$ F $\pm 10\%$ X7R 50V smd	510-3606-104
C 005	.1 $\mu$ F $\pm 10\%$ X7R 50V smd	510-3606-104
C 010	10 $\mu$ F 25V tantalum smd	510-2627-100
C 011	10 $\mu$ F 25V tantalum smd	510-2627-100
C 014	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 015	4.7 $\mu$ F 10V tantalum smd	510-2624-479
C 016	10 $\mu$ F 16V tantalum smd	510-2625-100
C 017	10 $\mu$ F 16V tantalum smd	510-2625-100
C 018	10 $\mu$ F 25V tantalum smd	510-2627-100
CR 001	Schottky diode, 1A/100V	523-0519-031
CR 002	Schottky diode, 1A/100V	523-0519-031
CR 003	Schottky diode, 1A/100V	523-0519-031
CR 004	Schottky diode, 1A/100V	523-0519-031
CR 006	Switching diode SOT-23	523-1504-002
CR 007	Switching diode SOT-23	523-1504-002
CR 008	5.6V zener SOT-23	523-2016-569
DS 001	Red/grn LED rt angle	549-4006-001
HW 006	Screw, TT 4-40 x .25 pan hd	575-0604-008
HW 012	Polarizing key	515-7109-010
J 001	Jack, 3.6 mm enclosed	515-2001-011
J 002	Jack, 9-pos PC mt	515-0506-043
J 003	Jack, power PC mt	515-2007-010
J 004	Header, 10-pin shrouded	515-7104-005
J 007	Jack, 2-pin sgl in-line hdr	515-7100-002
J 008	Jack, mini enclosed	515-2002-011
MP 001	Extruded metal enclosure	014-0777-021
MP 002	Back panel (DB9 end)	017-2206-017

## Remote Programming Interface

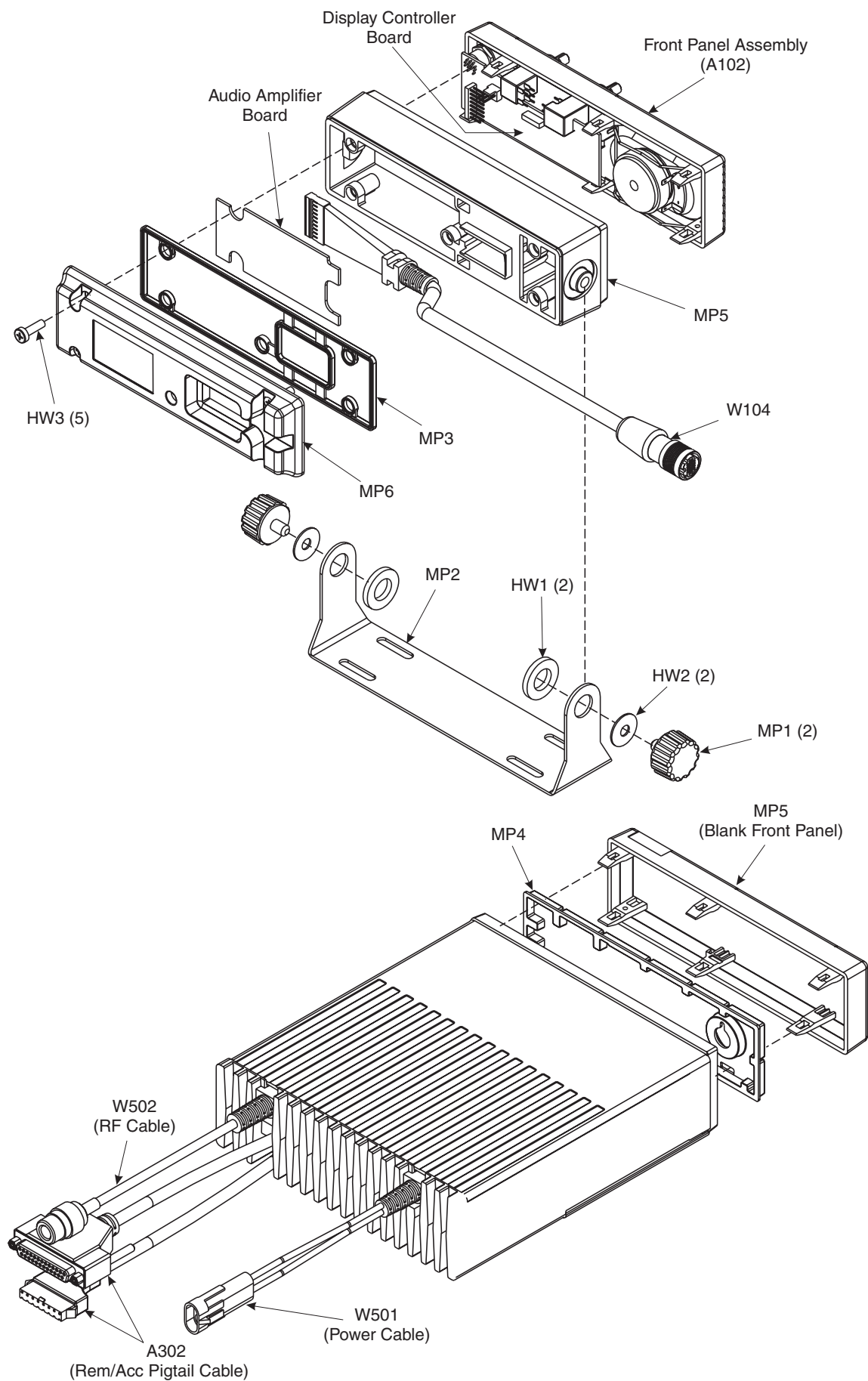
Ref No.	Description	Part No.
MP 003	Front panel (LED end)	017-2206-016
MP 007	Spacer, 4-40 hex male/female	013-1160-103
NP 001	ID/nameplate	559-5000-500
PC 001	PC board	035-5300-030
Q 001	NPN general purpose SOT-23	576-0003-658
Q 005	NPN general purpose SOT-23	576-0003-658
R 009	1k ohm $\pm 5\%$ 1/8w SMD	569-0115-102
R 010	200 ohm $\pm 5\%$ 1/8W smd	569-0115-201
R 012	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 013	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 020	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 024	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 025	3k ohm $\pm 5\%$ 1/8W smd	569-0115-302
R 028	3k ohm $\pm 5\%$ 1/8W smd	569-0115-302
R 029	3k ohm $\pm 5\%$ 1/8W smd	569-0115-302
R 032	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 035	300 ohm $\pm 5\%$ 1/8W smd	569-0115-301
R 036	3k ohm $\pm 5\%$ 1/8W smd	569-0115-302
R 037	Zero ohm $\pm 5\%$ 1/8W smd	569-0115-001
R 038	10k ohm $\pm 5\%$ 1/8W smd	569-0105-103
R 039	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 040	10k ohm $\pm 5\%$ 1/8W smd	569-0115-103
R 041	100k ohm $\pm 5\%$ 1/8W smd	569-0115-104
S 009	DIP switch, 8-pos SPST	583-5100-108
U 001	Regulator, 5V 0.5A 78M05	544-2003-079
U 004	RS-232 rx/tx, dual MAX232	544-2023-019
U 005	RS-485 bus xcvr SN65176	544-2023-027
U 006	Schmitt trigger 74HC14	544-3766-014
<b>PIGTAIL CABLE EMI BOARD</b> <b>Part No. 023-5300-643</b>		
C 001- C 020	470 pF $\pm 10\%$ 25V cer smd	510-3681-471
D 001 - D 010	TVS diode, dual 12V, 40W	523-2601-120
L 001	Ferrite EMI supp filter 200 mA	542-9230-024
L 002	Ferrite EMI supp filter 200 mA	542-9230-024
L 003	Ferrite EMI supp filter 200 mA	542-9230-024
L 004	Ferrite EMI supp filter 500 mA	542-9230-026
L 005	Ferrite EMI supp filter 500 mA	542-9230-026

Ref No.	Description	Part No.
L 006	Ferrite EMI supp filter 200 mA	542-9230-024
L 007	Ferrite EMI supp filter 200 mA	542-9230-024
L 008	Ferrite EMI supp filter 200 mA	542-9230-024
L 009	Ferrite EMI supp filter 500 mA	542-9230-026
L 010	Ferrite EMI supp filter 200 mA	542-9230-024
L 011	Ferrite EMI supp filter 500 mA	542-9230-026

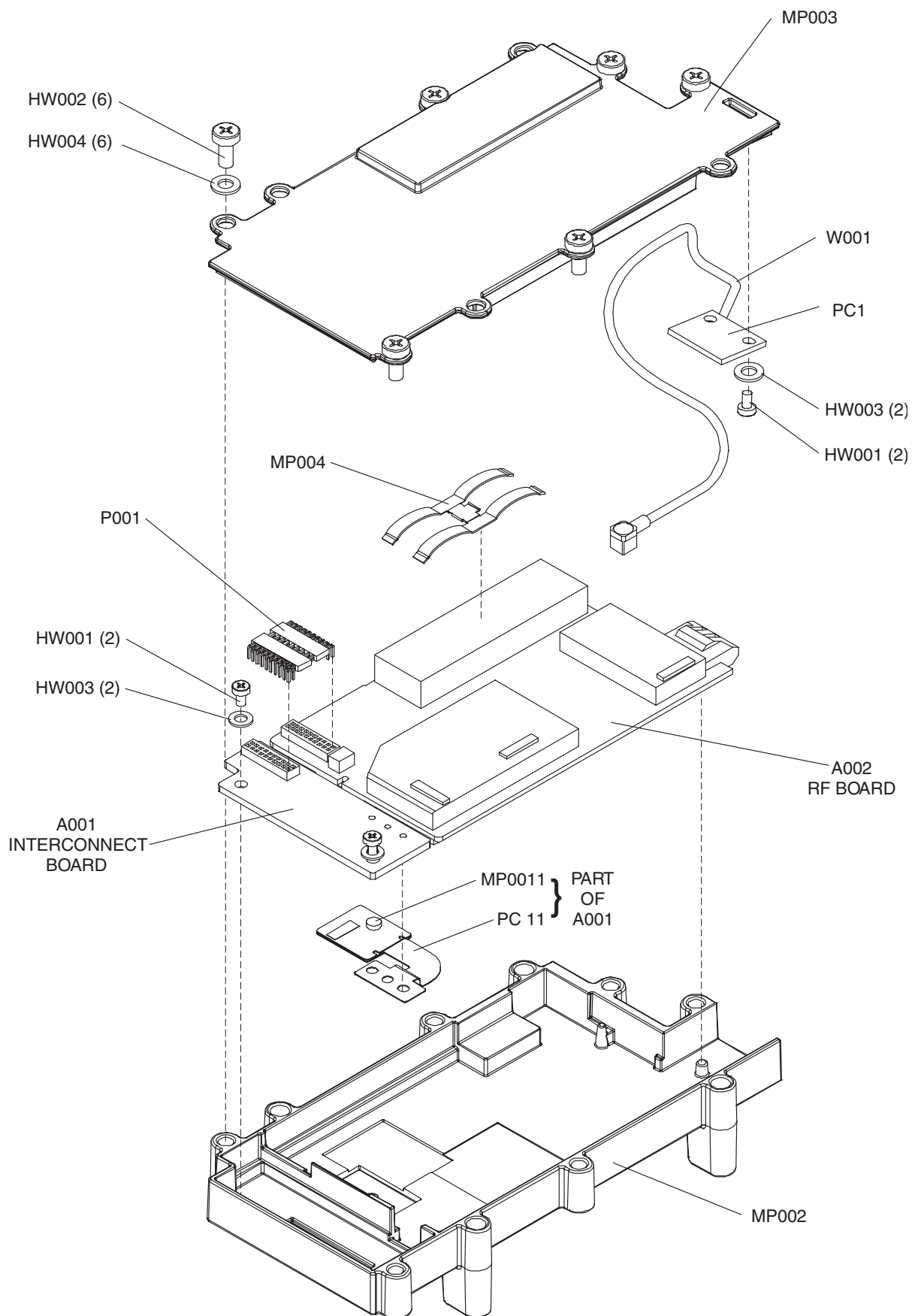
Ref No.	Description	Part No.
L 012	Ferrite EMI supp filter 200 mA	542-9230-024
L 013	Ferrite EMI supp filter 500 mA	542-9230-026
L 014-	Ferrite EMI supp filter 200 mA	542-9230-024
L 023		
PC 001	EMI filter PC board	035-5300-640



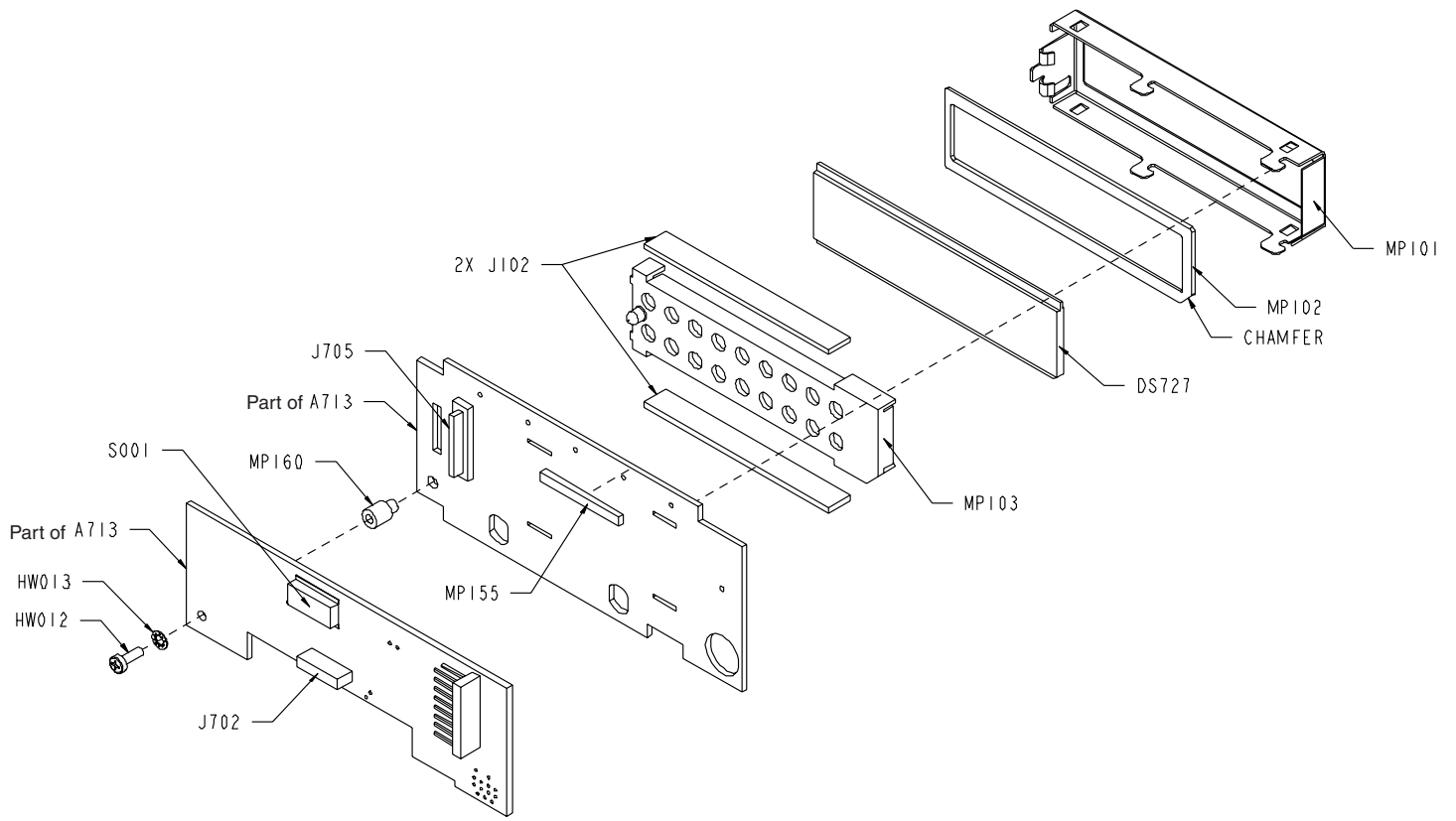
## CHASSIS ASSEMBLY



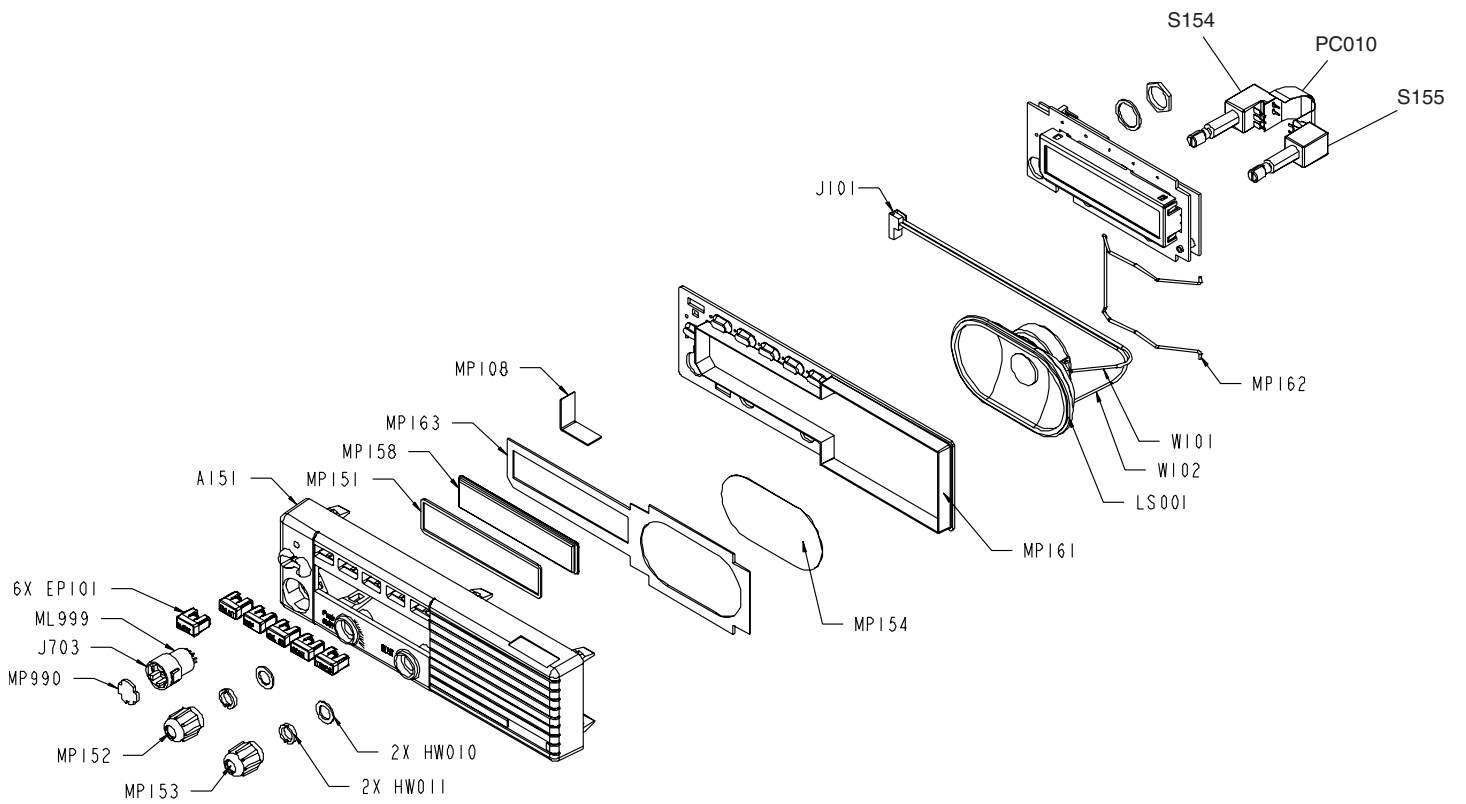
## REMOTE CONTROL UNIT/TRANSCIVER ASSEMBLY



**RECEIVER/EXCITER ASSEMBLY (A300)**

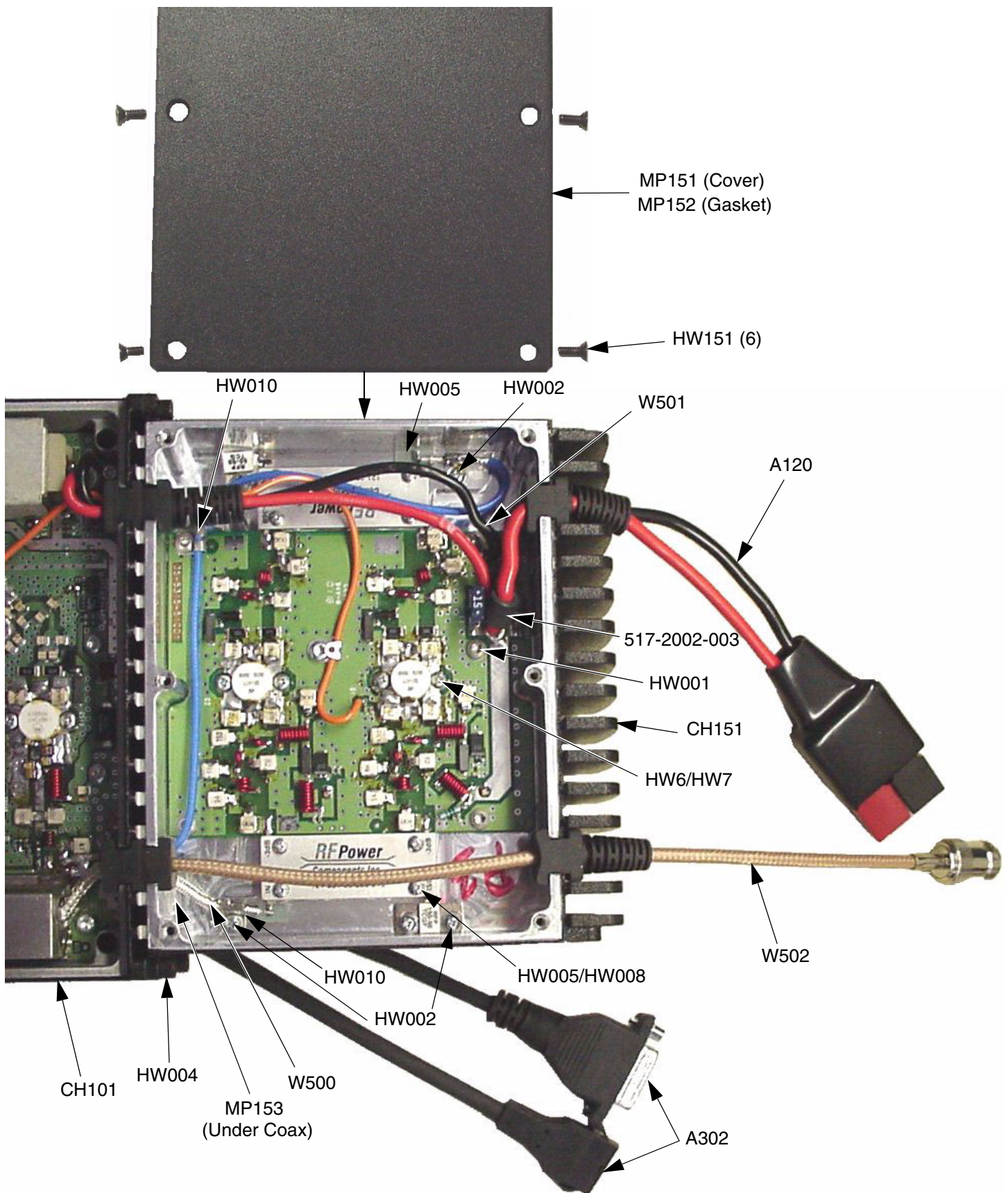


**DISPLAY ASSEMBLY (A713)**

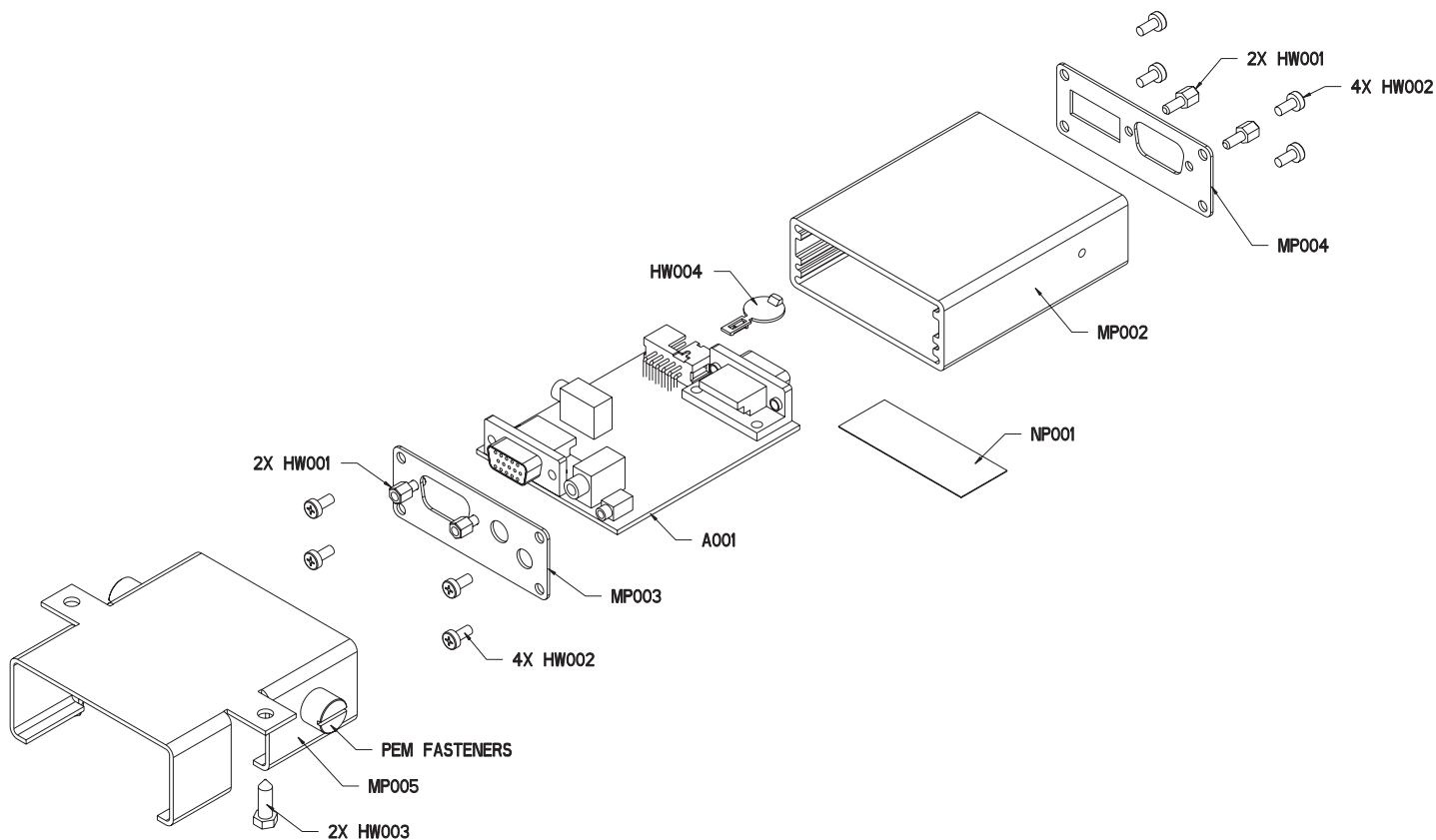


**FRONT PANEL ASSEMBLY (A102)**

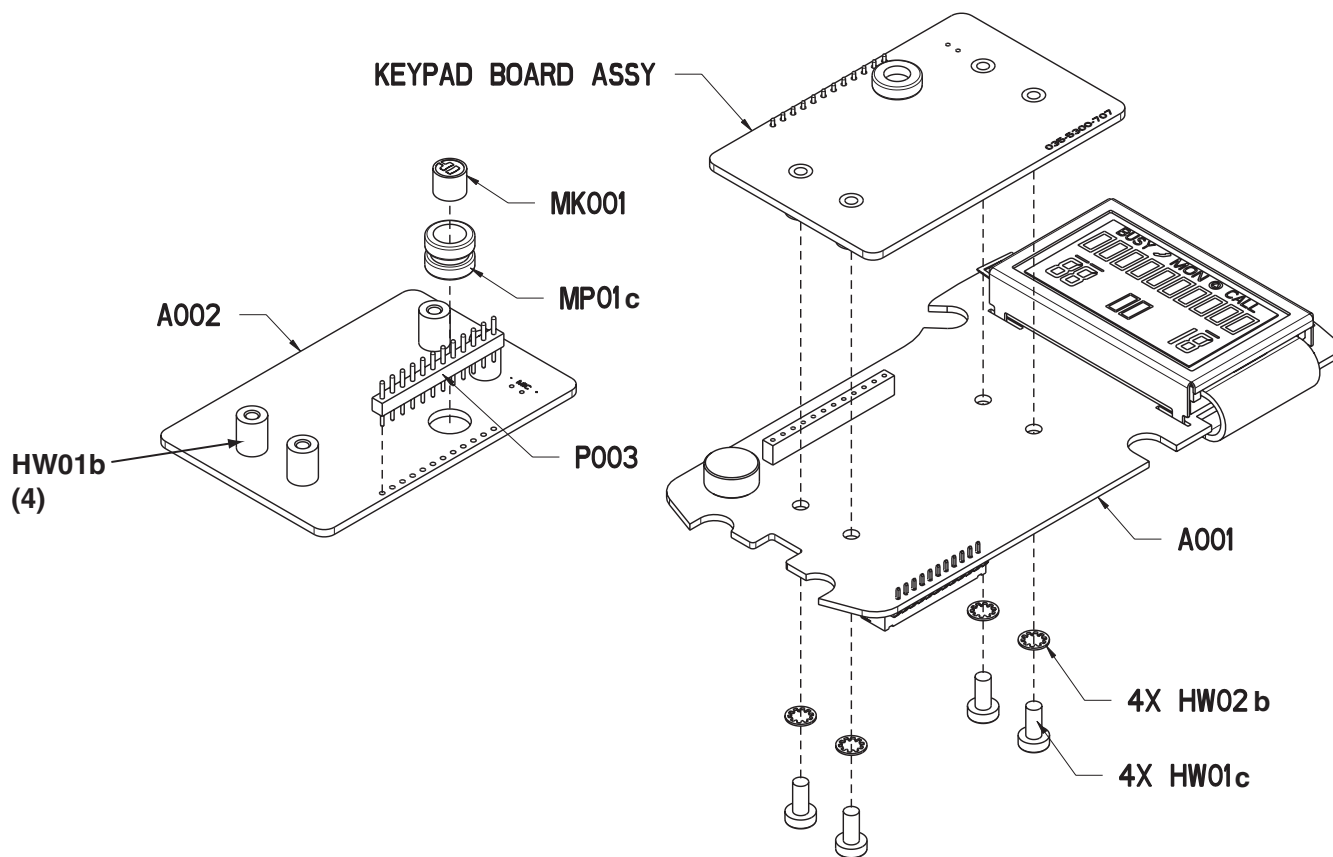




**100-WATT PA ASSEMBLY**



### HANDHELD CONTROL UNIT JUNCTION BOX



### HANDHELD CONTROL UNIT (PART 1 OF 2)



